THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

COMPUTERWORLD

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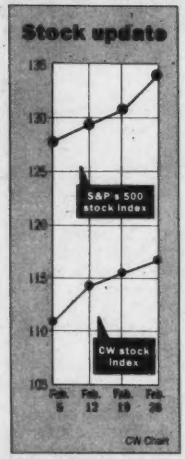

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NEWSPAPER

TOP OF THE NEWS

IBM's controversial bid to lift the 1956 Consent Decree is mired in Justice Department bureaucracy. **Page 114.**

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Borland International moves into the artificial intelligence market with Turbo Prolog. **Page 14.**

■

The federal government kicks off Gofor-12 in a bid to shorten computer procurements. **Page 2.**

■

A programmer workbench mimics Cullinet's ADS/On-Line, early users say. **Page 29.**

■

Optical storage expands desktop use, according to industry leaders, some of whom are meeting at Microsoft's CD-ROM conference this week. **Page 23.**

■

Memorex expects to make approximately 12 product announcements during 1986, all geared to capturing a piece of the IBM market. In its bid to recoup losses from the past couple of years, the company will focus on building peripherals for IBM's System/34, 36 and 38 products, double-density disk drives for large system users and cache storage devices.

■

Berkeley, Calif.-based Sybase, Inc. will introduce by mid-year a relational data management system that combines a 32-bit data base server with query, reporting and development tools running on connected host computers. The company is claiming that early benchmarks of the system show performance of roughly 30 transactions per second on a 1 million instructions per second version of the Dataserver processor.

■

Kurzweil Applied Intelligence, Inc.'s Voice Writer, a voice-recognition word processing device that will handle discrete, noncontinuous speech at up to 60 words per minute, is on track for a third-quarter introduction, inventor Raymond Kurzweil disclosed last week.

See **NEWS** page 4

IRS tests pick Zenith laptop

By Mitch Betts

WASHINGTON, D.C. — The Internal Revenue Service last week awarded its hotly contested contract for 15,000 laptop microcomputers to Zenith Data Systems Corp. The contract, the largest single purchase of laptops ever, is worth $27.6 million and had been widely reported as going to IBM.

Zenith's winning entry was its Z-171 model, an IBM-compatible unit with a 25-line, backlit LCD and two 5¼-in. disk drives. The laptop, which weighs in at 14.3 pounds and costs $2,399, will be used by IRS tax auditors in on-site field audits.

Packaged with the Z-171 in the winning bid was the software program Enable, a

See **IRS** page 4

AT&T's E-mail hits soft market

By Elisabeth Horwitt

NEW YORK — AT&T, the world's largest communications company, last week entered the electronic messaging service market amid evidence that the market is not expanding as rapidly as was once anticipated.

AT&T's new service, called AT&T Mail, offers software that relieves users of such electronic mail chores as routing and formatting. The company claims the software also enables users to save on service charges by preparing messages on an IBM Personal Computer or AT&T Personal Computer 6300 or 3B2 before signing on to AT&T Mail.

Spokesmen for companies that tested AT&T Mail last year cited the easy-to-use

See **AT&T** page 12

HP launches long-awaited RISC effort

But Spectrum units 930, 950 not ready until late '86, '87

By Jeffry Beeler

PALO ALTO, Calif. — In one of the most eagerly anticipated product debuts of recent months, Hewlett-Packard Co. last week publicly unveiled the first two products of its ambitious Spectrum program.

The company announced the Series 930 and 950 in a nationwide press teleconference. Both systems incorporate a different architecture from HP's popular 3000 family CPUs but retain compatibility with the older models.

The units represent a radical departure from conventional large systems architecture in their incorporation of reduced instruction set computing. RISC technology, by embodying simpler design and fewer chips than the 3000 family units, is capable of producing machines with smaller footprints and more power.

HP's 930 and 950 are said to provide up to three times greater internal throughput than the company's previous top-of-the-line business system, the 3000/68. Shipments of the 930 will begin during the fourth quarter of 1986, while the 950 will not be available until the second half of 1987. However, the company announced immediate availability of a non-RISC 3000/70, which provides 20% to 35% greater performance than the 3000/68 for a 20% lower price.

Current HP users contacted by *Computerworld* warmly greeted the announcement. "I was impressed with the methodology they use in their new architecture, especially the decision to put a dictionary on multiple disks," said Gordon Stock-

See **HP** page 7

CW EXCLUSIVE

Expert system: Boeing AI academy schools in-house talent

By Peggy Watt

Artificial intelligence. Everybody wants it, few companies can obtain it. One reason is that experts are still at a premium, especially experts capable of developing commercial applications. Boeing Co. solved this particular problem in a very straightforward way — by nurturing its own experts.

When the U.S. Department of Defense announced in 1981 that artificial intelligence technology would be a requisite in defense contract bids beginning in the late 1980s, defense industry leader Boeing of Seattle charged its Bellevue, Wash.-based subsidiary, Boeing Computer Services Co., to develop the expertise. Boeing Computer Services manages essentially all computing resources of Boeing and also markets remote computing services, training and support to outside clients.

"We decided AI was the data base of the '90s," recalls Bruce Wilson, Boeing Computer Services chief scientist. "If data bases are valuable, knowledge bases are even more valuable. Knowledge bases are the product line of tomorrow."

Janusz Kowalik

To hire the developers of tomorrow's products, Boeing Computer Services first canvassed the academic world and found that fewer than 50 degrees in AI technology had been awarded by only a handful of schools. Boeing's solution to the dearth of experts was to stock up from within.

In 1982, as a response to the corporate mandate, Boeing Computer Services established the Artificial Intelligence Support Center within its Advanced Technology Applications Division, and in early 1984, it launched an associates program within the new center.

Last week, the third class of 10 Boeing AI associates graduated after a year of intensive classroom training, homework and development of individual projects. The projects use AI techniques to solve problems in the Boeing divisions from

See **BOEING** page 15

GSA launches study to cut procurement to 12 months

By Mitch Betts

WASHINGTON, D.C. — When Thomas K. Lewis Jr. left the White House data processing staff to return to the private sector as vice-president for DP at First Boston Corp. in New York, he was struck by two things: the bigger paycheck and the faster pace of computer acquisitions in the private sector.

GSA administrator Golden

"Here we've made decisions to procure mainframes in a week or two. We don't have all of the bureaucracy and red tape associated with trying to make decisions," Lewis said.

In the federal government, the acquisition of a complex mainframe system typically takes about three years. Some exemplary procurements are wrapped up in as little as 11 months, while some horror stories stretch out to eight years, according to officials at the U.S. General Services Administration (GSA).

In addition to frustrating the end-user organization, these delays contribute to the government's problem with obsolete hardware, according to GSA administrator Terence C. Golden. In his prior job as a U.S. Department of the Treasury official, Golden said, he found that the multilayer procurement process often resulted in a system that was "already one generation behind by the time it landed in our computer room."

Golden said the procurement "labyrinth" must be reformed to help agencies acquire the technologies needed to improve productivity in the government, particularly in the prevailing budget-cutting climate.

Hoping to find out how to cut the red tape without trampling on the government's requirements for full competition and oversight, Golden last week launched his "Go-for-12" program to search for and test meth-

See GSA page 6

More blacks seek DP careers

By Charles Babcock

NEWARK, N.J. — More blacks are entering the data processing profession, but one of their major points of entry, computer programming, is becoming choked with too many applicants, said Earl Pace, chairman of Pace Data Systems, a custom software house and service bureau in Philadelphia.

"The trade schools are pouring out people who graduate only to find they can't find jobs. Unfortunately, many of them are black," Pace said during an interview recently at the Black Issues Convention in Newark.

Pace, the founder of Black Data Processing Associates (BDPA), was the keynote speaker at the convention, which was organized by the BDPA and other black professional groups to encourage networking among blacks and to interest black students in technology professions.

Pace said blacks are still disproportionately concentrated in the lower level jobs of programming, computer operations and data entry rather than in management.

Gail O'Neal, founder of communications consulting firm Genisys World Corp. in Cliffside, N.J., said opportunity exists for blacks in DP, but in many cases they must come to it by a circuitous route. She said she was going to teach math but she realized that the prospect bored her, so she switched to financial planning.

After getting a master's degree in business administration, she went to work for Exxon Corp. in information services, where she was encouraged to go into programming and applications development. She served as a systems analyst and applications developer for Exxon and AT&T before deciding to become a consultant.

"It was on the job that I made the transition. Someone else pushed me into it," she said.

BDPA, the Urban League and IBM are conducting a pilot project in Cleveland to increase computer literacy among black students. If successful, the organizations are considering making it a national effort.

Amdahl cuts prices on mainframes

By Jeffry Beeler

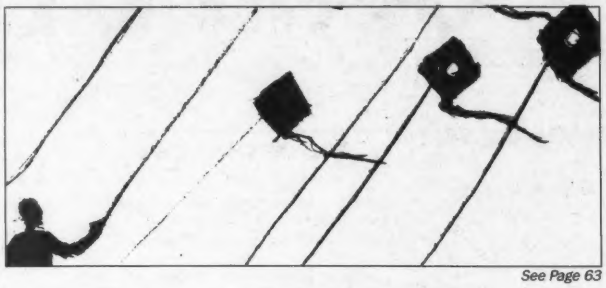
SUNNYVALE, Calif. — Amdahl Corp. last week countered IBM's latest mainframe price cuts by reducing prices for all 10 of its 580 series processors. The move will reportedly allow the company to regain the competitive position it lost briefly as a result of IBM's recent announcement.

In the wake of the cuts, which apply only in the U.S., the price of Amdahl's 5890 Model 200 was cut 9.1% to $4.6 million, costing 15% less than IBM's 3090 Model 200 while providing comparable performance, according to Amdahl marketing Vice-President Ollie Nutt.

A typical 5890 Model 300 configuration was reduced in price by 8.8% to $5.5 million, costing the same as the 3090 Model 200 but with 25% greater computing power, Nutt said last week during a press conference at Amdahl's corporate headquarters.

Amdahl's reductions come hard on the heels of IBM's recent decision to extend its 3090 series downward with two additional models and to pare the prices of its existing 3090 and 3080 processors by 10% and 20%, respectively. The two low-end extensions include the 3090 Model 180 and an intentionally degraded version, the 3090 Model 150.

In this issue



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HP's Spectrum announcement includes the introduction several software products, including a DBMS supporting both relational and networked capabilities/ **10**

Compuserv and MCI Communications announce the first linkup between two U.S. electronic mail services/ **12**

Borland introduces Turbo Prolog, promising a toolbox and new applications in the AI arena/ **14**

COMMUNICATIONS

DEC announces the VAX OSI Transport Service (VOTS), software thatimplements the transport layer of the seven-layer Open Systems Interconnect networking model on VAXs and Microvaxes running VMS/ **19**.

Data General released communications software that allows its MV/Eclipse machines to talk to each other over SNA networks/ **19**

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Although the U.S. Justice Department's review of the 1956 IBM Consent Decree officially remains open, there has been virtually no review activity in the past year/ **114**

EXECUTIVE REPORT

Managing data storage: Solving MIS and end-user data storage problems often requires the use of current technology, such as solid state devices and cache buffers, or the use of ingenious alternatives, such as shadowing techniques. Either approach, however, begins with an evaluation of needs. By Donna Raimondi/ **33**

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PAGE ONE ILLUSTRATION BY ALAN D. HOPKINS

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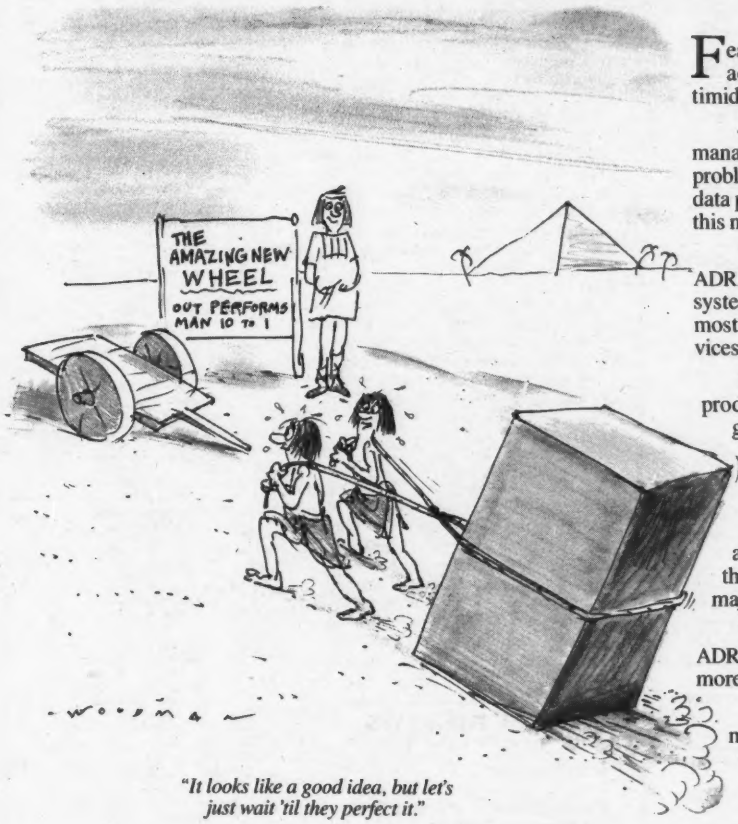

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IRS tests tap Zenith laptop

From page 1

product that includes spreadsheet, word processing, communications and data management modules. Enable is manufactured by the Software Group of Ballston Lake, N.Y.

IBM's failure to win the IRS contract was a surprise to many industry analysts. Both IBM and the IRS confirmed that IBM had bid for the contract — acknowledgement that IBM has developed a laptop model and can meet the IRS requirement to begin deliveries within 30 days. IBM would not comment on whether it intends to introduce a laptop.

AT&T Information Systems also bid on the contract, spokesman Barry Campbell said. "We were one of the bidders, and we are disappointed that we didn't win the bid," he said. Campbell said AT&T developed a product that was used in the bid but would not say if a product will now be announced.

According to James W. Lear, chief of the IRS' evaluation branch, the Zenith model had been the apparent winner since at least last December, when technical evaluations were completed. "I don't know where it came from," Lear said, regarding speculation of IBM's winning bid. "It didn't come from here."

Bid lowest amount

Lear said that Zenith, a division of Zenith Electronics Corp. in Glenview, Ill., won largely because it bid the lowest amount, and cost represented 40% of the grading system total. The Z-171's technical and support ratings were also strong, he said.

Andrew Czernek, director of marketing for Zenith, said last week the reports of IBM's supposed victory "scared the hell out of Zenith; we wondered what was going on."

Czernek further said that the IRS bid requirements requested vendors to deliver two machines upon submission of the bids. The IRS "really wanted products that weren't paper products only," he said.

Zenith licenses the Z-171 design from Morrow Designs, Inc. of San Leandro, Calif. Ironically, Sperry Corp. submitted a bid to the IRS for its Pivot laptop, based on the same Morrow design.

According to George Morrow, chairman of Morrow Designs, the Zenith version won on the basis of price and the company's ability to manufacture the units by the IRS deadline.

Under the IRS contract, Zenith will equip 15,000 Z-171s with modems, video cards, 512K bytes of random-access memory and rechargeable battery packs. Bundled software will include a personal services package of notepad, calculator and calendar as well as the Enable program.

A spokeswoman for Enable vendor the Software Group was elated at the IRS award. "We feel we helped Zenith to win the contract by meeting the IRS' software requirements," said Laura Hoffman, vice-president of marketing.

Distribute laptops to field

The IRS contract is part of the Automated Examination System being developed by the IRS and its prime contractor, Arthur Andersen & Co. Laptops will be distributed to IRS field auditors for the purpose of accessing the agency's mainframe computer files while conducting on-site tax audits and preparing reports [CW, Sept 24].

The contract calls for Zenith to supply maintenance, training and other support services through 1995. Deliveries must begin within 30 days following the Feb. 25 contract award and must continue at a rate of up to 1,000 a month for the next 18 months.

In addition to IBM, AT&T and Sperry, other vendors entering bids, according to the IRS, were Data General Corp., Texas Instruments, Inc., Federal Data Corp., Falcon Systems, Inc., JWK International Corp., Replitech, Inc. and PCA Microsystems.

Several other U.S. government agencies have announced plans to purchase large quantities of laptop micros for field agents, including the General Accounting Office and the U.S. Postal Service.

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Initially targeted at executives, The Voice Writer will support vocabularies of between 5,000 and 10,000 words. The price will be under $20,000.

■

Cambridge, Mass.-based Computer Corporation of America is boasting about winning what it claims may eventually be the single largest data base management system purchase contract ever awarded.

GTE Government Systems Corp. last week selected CCA's Model 204 as the initial DBMS to be used in GTE's project to upgrade the U.S. Department of Defense's DP systems. Over the life of the Worldwide Military Command and Control System upgrade — dubbed the WWMCCS Information System project — as many as 500 copies of Model 204 may be purchased. The agreement calls for the purchase of an unlimited number of copies, at a per-copy price, for use at project sites worldwide. Model 204 is priced between $155,000 and $250,000.

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Decworld targets IBM with distributed processing tools

By James Connolly

BOSTON — Engaging IBM on selected battlefields with weapons such as distributed processing power and networks was a key strategy for Digital Equipment Corp. as it hosted 20,000 DEC users and potential customers at Decworld '86 last week.

DEC announced only a handful of products during the five-day conference, instead concentrating its presentations on products introduced in recent months.

Many DEC presentations, particularly in a section of the show floor called the Solutions Center where applications for vertical markets were demonstrated, pitted DEC products against IBM products.

Those products introduced last week include the following:

- The DEC-Connect System, a wiring scheme that includes the $2,900 Thinwire Ethernet Multiport Repeater, which supports up to 232 devices at 10M bit/sec. transmission speeds in a radial configuration. Thinwire is reportedly one-tenth the cost per foot of standard Ethernet cable.
- Decnet-DOS V1.1, a $500 software package that expands the networking capabilities of the IBM Personal Computer AT and allows IBM Personal Computers direct connections to Ethernet, rather than through a VAX, with facilities for sharing files and data.
- Decnet-Rainbow V1.1, a $296 package that allows the DEC Rainbow personal computer to participate as an end node in Decnet.
- Three fourth-generation language software products — VAX Teamdata, VAX Rally and VAX Cobol Generator.
- The HSC70 mass-storage server for Vaxcluster systems with support for up to 32 disk and tape drives and a base price of $51,600.
- LAN Bridge 100, a store-and-forward and address filtering device that serially links up to eight Ethernet networks as a single logical network for $8,000 in baseband-to-broadband and baseband-to-baseband connections and $8,500 in baseband-to-fiber or broadband-to-fiber connections.

Rose Ann Giordana, DEC's vice-president for large systems marketing, said of the DEC-IBM rivalry, "We are going after any applications we have the capability of doing."

One attendee, a DP manager from a large insurance company, said his company uses IBM equipment almost exclusively. Asking to remain anonymous, he said, "I am here because I just am not that familiar with DEC. IBM cannot be all things to all people, and there might be some things that DEC can do better."

AT A GLANCE

U.S government information systems

Budget: $15 billion per year (including communications)

Major computer acquisitions over $50,000: 17,000 per year

Typical time needed to acquire a major system: Three years

Leading suppliers: AT&T, IBM, Sperry Corp., Honeywell, Inc., Digital Equipment Corp., Burroughs Corp. and Computer Sciences Corp.

Sources: General Services Administration, International Data Corp.

GSA study to cut procurement

From page 2

ods of shortening acquisition time to 12 months.

"We know it can be done in 12 months, because we've seen it happen," said Robert L. Ross, the veteran GSA troubleshooter who has been assigned to direct the program.

Ross said the program has three objectives:

- Identify and eliminate bottlenecks in the acquisition process.
- Evaluate the possibility of having various officials review procurements at the same time.
- Provide special training for contracting officers so they are thoroughly familiar with current regulations and techniques.

"I admire GSA for their guts in embarking on a big project like this," commented Lynn Bateman, a procurement expert and founder of Government Counselling Ltd. in Springfield, Va. But she said procurement reform should focus on improving the working conditions of the contracting officer who is faced with budget cuts, inadequate technical training, too many cases to handle and legal challenges from vendors.

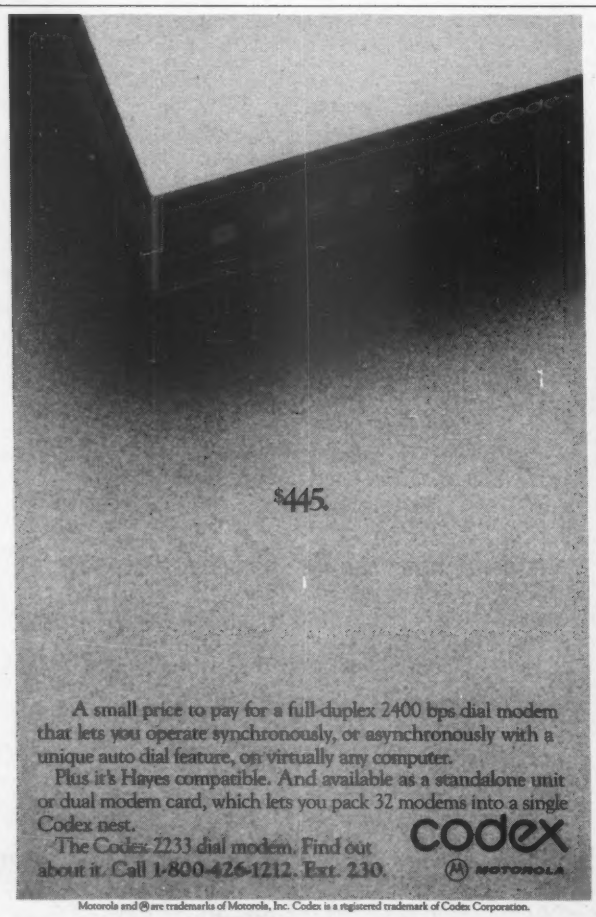
The procurement process is complex and is blocking managers' attempts to use the technology effectively and innovatively, according to a new report by Congress' Office of Technology Assessment.

Moreover, the latest policy directives from the Congress and the Office of Management and Budget (OMB) have given the government computer community conflicting signals about procurement.

Agency officials view the Competition in Contracting Act enacted by Congress in 1984 as likely to complicate procurements. This may occur because of the ease with which vendors can protest contract awards and because it is unclear whether compatibility-limited procurements — like those requiring IBM-compatible architectures — can still be considered fully competitive.

On the other hand, OMB's recent policy circular on information management gave a less wholehearted endorsement of competitive procurement. It said, "While competitive procurement is generally to be valued, its costs should be taken into account, including the cost to program effectiveness of unnecessarily lengthy procurement processes. Other conditions, like the need for compatibility, may also be legitimate limitations on the competitive process."

The OMB statement reflects the split between federal managers, who would prefer to err on the side of effectiveness even if that means less competition, and the congressional oversight panels, which strongly support competitive procurements.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HP launches RISC effort

From page 1

inger, a software specialist who works with HP 3000/68s at the Ford Motor Co. Electrical and Electronics Division.

However, many industry experts remain skeptical at the company's short-term prospects.

Analyst George Colony, head of Boston-based Forrester Research, Inc., said that if enough HP customers delay purchases in favor of the 930 or 950 machines, the company's order rates could collapse.

Ross Scruggs, president of Oakland, Calif.-based Telamon, Inc., an HP 3000/37 user, said the Series 70 will fit the needs of users "who don't need a quantum jump in horsepower." But, he added, "the people who are going to be upset by the delayed shipments are users who are quickly running out of juice and who have large, integrated applications that won't fit in one box."

'A strategic investment'

Gartner Group, Inc. analyst George Weiss said the RISC machines will only contribute marginally to revenue for an extended period because HP is offering upgrade credits that allow users to apply up to 80% of a Series 70 purchase toward purchase of a 930. But, Weiss added, "HP may look upon Spectrum primarily as a strategic investment."

Dean Morton, HP's chief operating officer, sharply defended his company in an interview in Boston last week. "Clearly, we have made our choice to go to a new architecture because we feel it will serve us and serve our customers better for the next 10 or 15 years than in simply making a major investment in a more conventional architecture."

In a recent interview, Doug Spreng, general manager of HP's Computer Systems Division, described the 930 and 950 as the first in a series that will support 48-bit addressing and that can be theoretically scaled to 64 bits. At 48 bits, the 930 and 950 would provide a memory space that is 65,000 times larger than conventional 32-bit processors.

Since announcing the Spectrum project in 1983, HP officials have emphasized that they wanted a common technological base for all future business and technical systems. The company said RISC-based technical products for engineering and manufacturing applications will be introduced in mid-1986.

HP, one of the legendary Silicon Valley start-ups, has staked a large portion of its future on RISC technology. "It is an informed gamble," HP's Morton said in an interview on the day of the announcement. "We don't think that the risk is any greater than it would be in trying to push the state of the art in semiconductor design or a lot of other paths that might have been chosen."

The 930 and 950 push HP's line into the IBM 4381-class performance range, Spreng said. Implemented in transistor-transistor logic technology, the 930 supports up to 24M bytes of main memory, executes 4.5 million instructions per second (MIPS) and provides twice the internal throughput of the 3000/68.

The 950, by contrast, is based on one-micron N-channel MOS circuitry and, at 6.7 MIPS, outperforms the 3000/68 by threefold, he added.

The RISC machines preserve full compatibility with existing 3000-class applications, HP officials said. To take full advantage of the processors' expanded performance, such applications will have to be recompiled, though not rewritten.

Ask Computer Systems, Inc., an independent developer of HP software applications, ran one of its Series 68 commercial applications on a 930 at near-native-mode performance after the source code was recompiled and streamlined by the CPU's optimizing compiler, said Martin Browne, vice-president of software development at Ask.

The RISC technology incorporates 140 instructions rather than the 250 instructions used in earlier HP 3000 processors. The architecture also involves replacement of microcode with high-level language instructions called "millicode" in ordinary memory, use of segregated caches for data and instructions, fixed-length and fixed-format instructions, execution

See HP page 8

NEW HEWLETT-PACKARD CO. CPUs

	Series 70	Series 930	Series 950
MIPS[1]	1.6	4.5	6.7
Relative Performance[2]	8	12	18
Machine Cycle Time (Nsec)	75	125	Not available
Main Memory (Megabytes)	8-16	16-24	24-64
Technology	Emitter-coupled logic	Transistor-transistor logic	N-channel MOS
Base Price	$150,000	$225,000	$300,000-$350,000
Delivery	Now	Fourth-quarter 1986	Second-half 1987

[1] Million instructions per second
[2] HP estimate based on HP 3000/37 equaling 1.

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HP product future hinges on redesigned CPU architecture

By Jeffry Beeler

PALO ALTO, Calif. — In announcing the first results of its Spectrum development project, Hewlett-Packard Co. last week did more than simply extend its business processor line at the high end.

The introduction of HP's 3000 Series 930 and 950 marks a turning point — for good or ill — in the firm's long-term product strategy and in its evolution as an information systems vendor. HP christened a fundamentally redesigned architecture that reportedly will shape the company's hardware and software moves through the 1990s.

ANALYSIS

Probably not since 1978, when IBM introduced its System/38, has a vendor produced an architecture that differs so sharply from orthodox mainframe design.

The architecture underlying the 930 and 950 does embody the principles of reduced instruction set computing (RISC), but a reduced instruction set is only one of many architectural changes that set the two newcomers apart from more conventionally designed machines.

In contrast to the von Neumann architectures that have long served as a large systems standard, the 930 and 950 segregate data and instructions into discrete caches rather than lumping them together in the same cache. "The use of dual caches in effect doubles a processor's bandwidth," according to William Worley, manager of HP's Information Software Operation.

Key elements in HP architecture

Other key elements in HP's revamped architecture include the following:

- Replacement of microcode with millicode, which comprises combinations of primitive instructions written in high-level languages in ordinary memory.
- Instructions that use fixed lengths and formats to aid pipelining.
- Use of both hard-wired instructions and optimizing compilers.
- The ability to execute most instructions in one machine cycle, unlike typical CPUs, which usually expend multiple cycles per instruction.
- A battery of 32 general-purpose registers designed to speed instruction execution and minimize references to storage.
- A design that makes memory accessible only to LOAD and STORE commands.

Although many of these features are an outgrowth of RISC, others are plainly complementary. Examples of non-RISC design elements include a 64-bit addressing capability, an I/O subsystem that addresses storage devices no differently from main memory and support of multiprocessors and special-purpose coprocessors.

Together, the design traits form HP's High Precision Architecture, which will provide a common technological base for all the company's future systems, both business and technical.

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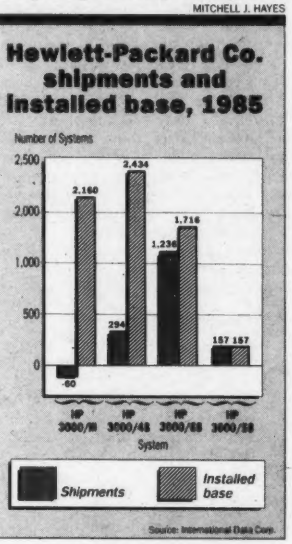

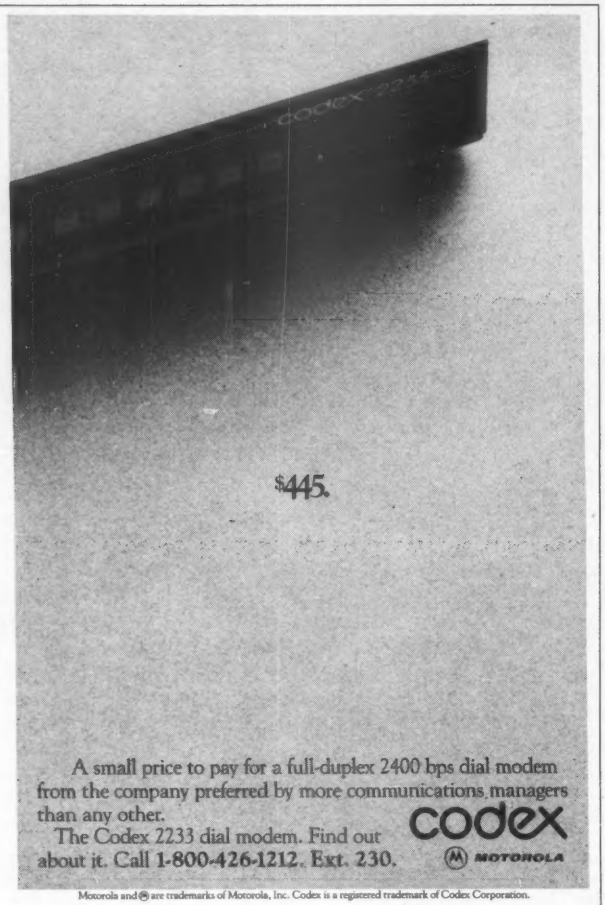
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HP launches RISC effort

From page 7

of most instructions in a single machine cycle and 32 general-purpose registers.

One reason that the 930 and 950 provide a compatible upgrade path for existing HP 3000 users is that last week's announcement also included a revised version of the company's MPE operating system.

On the software side, last week's introduction also included the debut of an upgraded data base management system (see story page 10).

HP 3000 users who have exhausted the capacity of their existing systems will be able to obtain immediately the Series 70 business processor. The 70 replaces the 68, which can be field-upgraded in about two hours, Spreng said.

Also featured in last week's announcement was a distributed terminal controller that supports up to 48 devices on the RISC processors. A 48-port configuration of the distributed terminal controller costs $22,000.

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iebcopy	9 min. 14 sec.	1 min. 20 sec.	10,792	$18.47
PDSFAST	48 sec.	.7 sec.	122	$1.75
47 cyl. PDS Unload to Tape				
iebcopy	58 min.	14 min. 52 sec.	97,253	$92.05
PDSFAST	4 min. 3 sec.	37 sec.	911	$5.74
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NEWS

Software offerings accompany Spectrum announcement

DBMS has relational, networked capabilities

By Maura McEnaney

PALO ALTO, Calif. — Last week's Spectrum announcement from Hewlett-Packard Co. was laced with several major software announcements aimed at easily migrating current users over to HP's Precision Architecture.

A data base management system with support for both relational and networked capabilities was seen by analysts as the most significant among those announcements.

"The new data base [called Allbase/XL] is enormously appealing to users," according to Linda O'Keeffe, director of Office Systems Industry Service at Dataquest, Inc. Users will now be able to access and share data stored in both relational and networked methods. "In the past, users of relational DBMS methods were willing to give up some system performance in exchange for convenience," said Dataquest's Gwen Peterson, director of Business Computer Systems Industry Service. Giving them the choice is a wonderful capability, she said.

Allbase/XL DBMS for the new Series 930 and 950 computers eliminates the need to maintain both a relational and a networked data base. It includes two interfaces: the HP Structured Query Language (HPSQL) interface, a relational product that accepts IBM's SQL commands in both programmatic and interactive forms; and the HPimage interface, which provides traditional network-model access to data bases.

HPimage is said to increase processing speeds by incorporating predetermined data access paths. It also includes generic search capabilities that allow users to conduct a search based on a partial definition of an item name.

Current HP Turboimage applications are compatible with the new DBMS.

Allbase/XL is included in the total price of the HP 3000 Series 930. Purchased alone, it costs $30,000 and will be available in the fourth quarter.

HP also announced an enhanced version of its MPE operating system. Dubbed MPE/XL, the new operating system includes a proprietary mapped-file capability said to enhance I/O throughput by directly accessing data files stored on disk.

The company also introduced a new set of language compilers for the Spectrum machines. Designed to work with HP's reduced instruction set computer architecture, the Fortran 77/XL, Pascal II/XL and Cobol II/XL compilers are compatible with MPE/V-based compilers. Fortran 77/XL and Pascal/XL cost $7,000. The Cobol II/XL costs $8,500. They will be available in the fourth quarter.

The firm also announced a set of Spectrum applications development tools. The HP Toolset/XL is said to provide facilities for full screen editing as well as symbolic debug capabilities for developers using the new Fortran, Pascal and Cobol compilers. Toolset/XL costs $7,000 and will also be available in the fourth quarter.

> ***'The new data base is enormously appealing to users.'***
>
> — Linda O'Keeffe Dataquest, Inc.

HP also unveiled IBM connection capabilities with Systems Network Architecture (SNA) Server software and Server Access software. HP's SNA Server software can be combined with HP SNA Server Access software to connect HP 3000 users with HP's existing SNA/Network Remote Job Entry or SNA/Interactive Mainframe Facility to access with IBM mainframes running MVS systems in both interactive and batch modes.

The HP SNA Server software can reside on an HP 3000 system acting as a file server, and SNA Server Access software works on each networked HP 3000. The HP file server can be used concurrently for other applications.

The HP SNA Server software costs $1,000 for the HP 3000 running MPE/V. HP SNA Server Access software is $1,200 for the new Series 930 model, and $1,000 for the Series 70 and other HP 3000 models.

In addition to the Spectrum software, HP announced several new products for machines running the MPE/V operating system. HPSQL/V is a relational DMBS for the MPE/V systems, but its application programs are fully compatible with the HPSQL interface of Allbase/XL, the company said. The product costs $15,000.

Other software products introduced last week included:

- The HP System Dictionary/V for both the Series 930 and MPE/V-based machines. The System Dictionary/V documents HP 3000 system data, programs and files, user access and network configurations. The System Dictionary/V costs $6,500 for Series 3000 machines running MPE/V. It costs $9,750 on the Series 930.
- Business Report Writer/V, a report writing system that is said to allow users to put data from several sources into a single report. Available for all HP 3000 models, the product is priced at $8,000.
- Turboimage DBchange/V for modifying data structures and expanding the capacity for HP Turboimage data base. The product costs $5,000.

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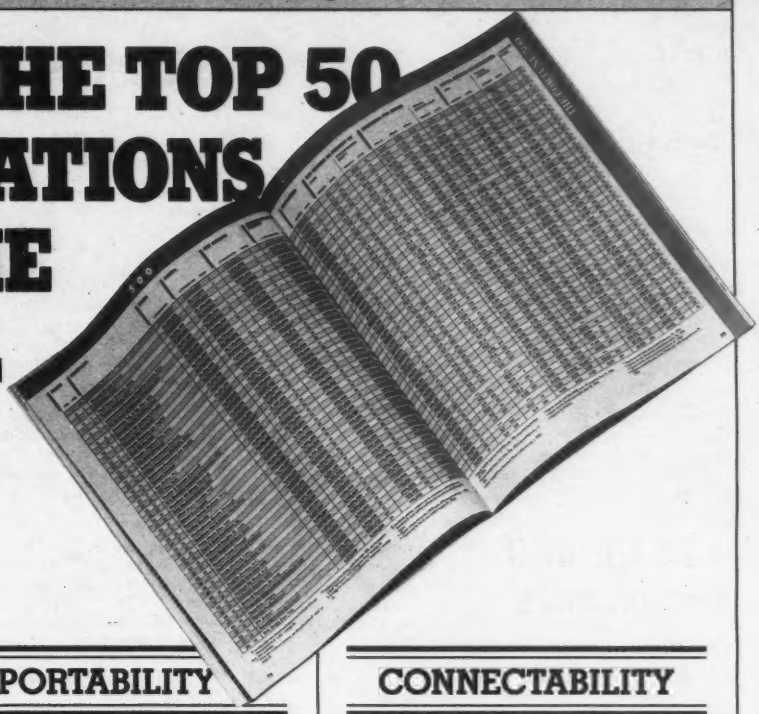

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Amarillo ..... March 4	Ft. Lauderdale ..... April 10	New York City ..... March 11, 19,	San Antonio ..... April 22
Atlanta ..... April 22	Ft. Worth ..... March 11	April 9, 22, May 14	San Diego ..... April 17
Austin ..... March 25, May 27	Halifax ..... March 19	Newport Beach ... March 18, May 13	San Francisco ... March 25, April 24
Boise ..... March 20	Houston March 20, April 17, May 15	Oklahoma City ..... April 15	Seattle ..... April 3
Boston .. March 11, April 15, May 13	Huntsville ..... May 8	Omaha ..... April 22	Sunnyvale March 11, April 10, May 8
Chicago ..... March 13, April 16	Indianapolis ..... March 11	Orlando ..... April 9	Syracuse ..... May 8
Cincinnati ..... March 4	Iselin, NJ ..... March 20, May 15	Ottawa ... March 13, April 10, May 8	Toronto .... March 4, April 8, May 6
Cleveland ..... April 2	Kansas City ..... May 6	Philadelphia ..... March 20	Tulsa ..... May 20
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Columbus ..... March 5	Little Rock ..... May 13	Portland ..... March 4, May 6	Washington ..... March 5, 19,
Convent Station, NJ ..... April 7	Los Angeles March 13, April 8, May 8	Quebec ..... June 18	April 9, 22, May 7
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Compuserve, MCI connect their electronic mail services

First U.S. linkup may be trendsetter

By Stanley Gibson

Last week, in what may be a trendsetting move, Compuserve, Inc. and MCI Communications Corp. announced the first linkup between two U.S. electronic mail services.

MCI Mail subscribers can now exchange electronic messages with users of Compuserve's two electronic mail services, Infoplex and Easyplex. Infoplex is used by Compuserve's Fortune 500 customers; Easyplex is used by some 270,000 personal computer users who subscribe to the Compuserve Information Service.

"It is a major step toward an electronic postal system, away from isolated, competing mail services," said MCI President J. Robert Harcharik. MCI and Compuserve will continue to function as separate entities, however.

Trend toward interconnection

Michael Cavanagh, executive director of the Electronic Mail Association (EMA), said that the MCI-Compuserve alliance was part of a trend toward interconnection among electronic messaging services. Another move in that direction was the recent linkup between GTE Telenet Communications Corp.'s Telemail and Telecom Canada's Envoy 100 messaging services.

"By 1992 to 1993, it will be news if any service provider is *not* connected to another," Cavanagh said. "Now, you don't know which, if any, electronic mail system someone is on, so you still have to play telephone tag."

The MCI-Compuserve linkup should alleviate but not solve the telephone tag problem. Although more than half a million users can now communicate with one another via the two electronic mail systems, there is as yet no sharing of directories, according to MCI spokesman John Houser.

Another potential source of confusion is that the two vendors charge differently for the linkup. A Compuserve user must pay both Compuserve connect time and MCI Mail charges. An MCI Mail user does not pay extra to communicate with Compuserve users.

Revenue derived from users crossing over between the two systems will be shared between the two companies according to a formula that, according to Houser, is based on usage and "will not be 50-50."

Houser added that MCI is considering linking up with other services. MCI is working with the EMA on a product based on MCI Mail's Link protocol that would link all of the association's member service companies.

AT&T E-mail hits soft mart

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software as the intial reason they chose the service over competitors. "It took us about 10 minutes to train each user on the system," said a spokesman for one test site, New York's R. H. Macy & Co. department store chain.

Despite AT&T's having signed up an estimated 200 business customers through its testing process last year, industry analysts point to declining expectations for electronic mail service revenues as an indicator of troubles that may lie ahead.

The recently released 1985 Electronic Messaging Report from Link Resources Corp., a New York-based analysis firm specializing in electronic mail, was markedly less optimistic than previous reports. While Link's 1984 report had predicted total electronic messaging industry revenues for 1985 of $478.3 million, the 1985 report projected revenues of $300 million. The 1984 report had predicted that by 1988 industry revenues would reach $2.126 billion, yet the 1985 report anticipated that 1990 revenues would be only $1.548 billion.

Among the reasons the report gave for its "less than-optimistic forecast" were a slowdown in microcomputer sales, lack of electronic mail connectivity standards and "prohibitive costs" that are not justified by the services' capabilities.

'Market is slowing down'

AT&T spokesman Barry Campbell admitted to having "heard rumors that the electronic mail market is slowing down." Campbell added that he expected AT&T Mail's ease-of-use features to overcome any general market trend.

Representatives of two

See **AT&T** page 13

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AT&T E-mail hit soft mart

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AT&T Mail beta test sites, Macy and Black & Decker Manufacturing Co., agreed with Campbell. Macy, which became an AT&T Mail subscriber in October, had become dissatisfied with the telex system used to connect its New York headquarters with import/export branches in Asia.

"Telex is 1920s technology," a Macy spokesman said last week. "It's slow — up to 300 bit/sec. — and blind: You get no acknowledgment of transmissions. An electronic mail service allows us to move messages at rates of at least 1,200 bit/sec."

Macy opted for the AT&T Mail's IBM Personal Computer software, the spokesman said, because "It employs a very, very simple approach. It does a lot of work *for* the user. Other vendors offer software, but it isn't as friendly."

The company discovered that the service provided the ability to tie in directly with local electronic mail systems running on Unix hosts such as the AT&T 3B2. This ability allows subscribers to use their in-house IBM Personal Computers or 3B2 minicomputers in combination with the service.

Macy has installed 3B2 mail centers in Hong Kong and at its New York headquarters. Messages are sent from remote sites to mailboxes on AT&T Mail premises, where they are automatically forwarded to the recipient's mailbox on the in-house 3B2.

Connection to U.S. mail services

AT&T Mail held several attractions for Black & Decker. "It is priced competitively. We liked the fact that we could use AT&T Mail to transmit binary files generated by Lotus or Multimate and the connection to the U.S. mail services for hard-copy delivery," said senior planning analyst William Thompson. "But other services provide that, so I guess the bottom line for us was the easy-to-use software."

Black & Decker installed a 3B2 minicomputer at its Towson, Md., headquarters. The 3B2 runs Private Message Exchange (PMX), a Unix-based electronic mail system. Electronic mail sent to mailboxes on the AT&T Mail system is automatically forwarded to the 3B2, where it is picked up by users in locations all over the world.

The company currently uses telex to communicate with remote locations in 40 countries overseas, but it is gradually replacing the telex links with connections over Tymnet/McDonnell Douglas Network Systems Co.'s Tymnet packet-switching service. In the meantime, AT&T Mail provides a telex gateway to the remote sites.

In-house voice/data system

The appliance company's long-term goal is one in-house voice/data mail system — which means gradually phasing out AT&T Mail service while retaining the easy-to-use communications software and 3B2 mail centers. Thompson said large companies are most likely to form transitory relationships with the service.

AT&T Mail's Unix connection fits in well with Black & Decker's plans to gradually move more and more messaging traffic onto its internal networking system, which is based almost entirely on AT&T digital private branch exchange equipment.

"With PMX and the Tymnet overseas links we expect to save $500,000 to $1 million in communications costs by early 1987," Thompson said.

According to Campbell, large businesses constitute AT&T Mail's primary market. "We are aiming the service primarily at Fortune 500 corporations that have multiple sites and need to communicate with other businesses."

AT&T's strategy has a good chance of success, according to Walter E. Ulrich, president of Walter Ulrich Consulting of Houston, Texas. "I think AT&T Mail is a strong, competitive, feature-rich product which will be helped by the fact that AT&T is already strong in the medium-size and large company market. It is not interested in selling electronic messaging to John Q. Public but to corporations with whom it is developing long-term business relationships."

Public electronic mail services 1984-1990

	Messages per Year (in millions)	Revenues (in millions)	Percent Increase in Revenues
1984	95	$ 200	—
1985	140.4	300	50
1986	209.3	450	50
1987	307.3	630	40
1988	450	882	40
1989	616.9	1,191	35
1990	815	1,548	30

Source: Link Resources Corp.

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UNIX Fundamentals for Non-Programmers*		Mar 19-21 Jul 9-11 Sep 17-19	Mar 12-14 Jul 23-25	Jan 29-31 Apr 30-May 2 Oct 22-24	Mar 12-14 Jul 23-25	Feb 5-7 Apr 16-18 Aug 27-29	Jan 29-31 Apr 30-May 2 Oct 22-24	Jan 15-17 Mar 12-14 May 21-23 Jul 23-25 Oct 1-3 Nov 19-21	$735	
UNIX Fundamentals for Programmers*	Jan 15-17 Mar 12-14 Jun 4-6 Jul 30-Aug 1 Sep 24-26 Nov 19-21	Mar 31-Apr 2 Jul 14-16 Sep 22-24	Mar 17-19 Jul 28-30	Feb 3-5 May 5-7 Oct 27-29	Mar 17-19 Jul 28-30	Feb 10-12 Apr 21-23 Sep 8-10	Feb 3-5 May 5-7 Oct 27-29	Jan 20-22 Mar 17-19 Jun 2-4 Jul 28-30 Oct 6-8 Dec 1-3	$735	$1125
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'C' Language Programming*	Feb 24-28 May 12-16 Jul 14-18 Sep 8-12 Nov 3-7	Apr 7-11 Jul 21-25 Sep 29-Oct 3	Mar 31-Apr 4 Aug 4-8	Feb 10-14 May 12-16 Nov 3-7	Mar 31-Apr 4 Aug 4-8	Feb 17-21 Apr 28-May 2 Sep 15-19	Feb 10-14 Apr 12-16 Nov 3-7	Jan 27-31 Mar 31-Apr 4 Jun 9-13 Aug 4-8 Oct 13-17 Dec 8-12	$1225	
Shell Programming*	Jan 22-23 Mar 19-20 Jun 11-12 Aug 6-7 Oct 1-2	Apr 14-15 Jul 28-29 Sep 6-7	Apr 7-8 Aug 11-12	Feb 17-18 May 19-20 Nov 10-11	Apr 7-8 Aug 11-12	Feb 24-25 May 5-6 Sep 22-23	Feb 17-18 May 19-20 Nov 10-11	Feb 3-4 Apr 7-8 Jun 16-17 Aug 11-12 Oct 20-21 Dec 15-16	$490	$1125
Using Advanced UNIX Commands*	Jan 29-31 Apr 9-11 Jun 18-20 Aug 13-15 Oct 8-10 Dec 3-5	Apr 16-18 Jul 30-Aug 1 Sep 8-10	Apr 9-11 Aug 13-15	Feb 19-21 May 21-23 Nov 12-14	Apr 9-11 Aug 13-15	Feb 26-28 May 7-9 Sep 24-26	Feb 19-21 May 21-23	Feb 5-7 Apr 9-11 Jun 18-20 Aug 13-15 Oct 22-24 Dec 17-19	$735	
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Borland enters AI arena with Turbo Prolog development tool

Kahn says product to spur use of AI

By Peggy Watt

SCOTTS VALLEY, Calif. — Borland International, Inc. plans to announce today Turbo Prolog, its first venture into the artificial intelligence arena. The announcement is the first in an expected new family of products, including both development tools and application programs with AI features.

Borland President Philippe Kahn last week said Turbo Prolog is "a complete, interactive development system" that will help spur widespread use of AI, especially with its $99.95 price.

Borland's version of Prolog is a declarative language with a true incremental compiler that generates native code and linkable object modules compatible with an IBM PC-DOS linker, according to a Borland spokeswoman. If the compiler detects an error and stops in progress, it will position the cursor at the error in the source code, she said.

The language also supports full 32-bit memory addressing, offers an interactive full screen editor and includes pull-down menus, both graphical and text-based windows and on-line Help. The software will run on the IBM Personal Computer and compatible systems and is scheduled to be available April 25.

Kahn said Turbo Prolog represents Borland's "new generation of compilers," which support modular programming and can exchange libraries. The next version of Borland's cornerstone product, Turbo Pascal, is due out before the end of the year and will be able to exchange some information with Prolog, Kahn said.

Kahn predicted Turbo Prolog will outsell its Pascal predecessor, which the company reports has sold some 500,000 copies. Other language products are forthcoming, including versions of Basic, Modula 2 and C.

Kahn said he expects new Borland application programs will be written in Turbo Prolog and feature such artificial intelligence characteristics as natural language query capabilities and expert system shells. Another Borland product, the Turbo Lightning reference library, is well suited to interfaces built with Turbo Prolog, he added.

Kahn said Borland's internal tests surpassed execution speeds of 100,000 logical inferences per second, a standard of measuring an AI development tool's speed.

Louis Robinson, editor of "The Spang Robinson Report," an AI newsletter in Palo Alto, Calif., commented that there is "still some question whether microcomputers can use the full power of high-level languages" and that the new product's execution times "sound pretty outrageous" but could depend on the applications.

Harvey Newquist, editor of the "AI Trends," newsletter from DM Data, Inc. of Scottsdale, Ariz., pointed out that Prolog "is one of the newer languages and not the kind most people are used to using."

Neither are Prolog-based products abounding. Industry watchers cited only a few young developers. Logicware, Inc. of Toronto recently released an upgraded Microsoft Corp. MS-DOS version of its $495, 2-year-old M Prolog, which includes a compiler and is also available for larger systems. Microprolog from Programming Logic Systems of Milford, Conn., is a $295 package that has been available for more than a year. A handful of smaller firms offer more limited Prolog interpreters.

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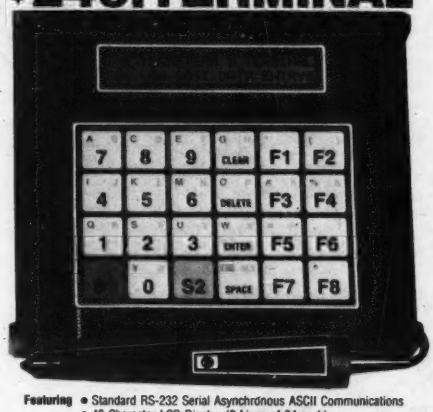

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Boeing schools AI talent

From page 1

which they came.

Now the graduate associates become AI ambassadors, implementing their program projects in the workplace and sharing their new techniques.

Boeing's associates program is comparable to a graduate program in artificial intelligence theory and methodology, says Janusz S. Kowalik, manager of technology transfer and 'dean' of Boeings' internal institution of higher education. Pairing the Boeing Computer Services program with a university's curriculum and actually awarding graduate degrees is a future possibility; but Kowalik stresses that Boeing Computer Services graduates enjoy a position that is more immediately valuable to themselves and their employers than if they earned AI degree status.

Changing lives

"We are giving these people a unique background. We are changing their lives and their life opportunities," Kowalik says.

"AI is not a thing, it's a way of thinking about problems," chief scientist Wilson notes. "Rather than thinking about everything as a program, you think about it in declarative programming."

Associates take classes in logic, symbolic relationships, AI programming languages and other topics related to their fields of interest. The latter includes knowledge engineering, natural language, automated programming and robotics, particularly machine vision and speech recognition.

The associates' term projects are part of their application for admission to the program, which receives inquiries from about 40 employees in a year, although it can accommodate only 20 in the two classes scheduled each year. A new session begins every six months at Bellevue headquarters, and the program draws from among a total of 106,000 employees throughout Boeing's 18 major sites in the U.S. and Canada.

Academic background

Strong computer science background is a requisite, though the associates' academic backgrounds may be as diverse as engineering and psychology, said Richard A. Escobedo, AI specialist and an instructor in the associates program.

"Competition is getting stiffer. The project descriptions are getting more complex and better written," according to Escobedo.

The first class of associates, graduated in February 1985, is just now beginning to see the fruits of its AI methods in the original departments. "It usually takes a year before an application can be made real," Kowalik notes.

One member of that first class is William J. McClay, who returned to his post at Boeing Computer Services' support group for Boeing Electronics with the new title of knowledge engineer. He returned, McClay recalls, brimming with ideas for a new knowledge base system to process specifications for connector assembly. "You're talking about process specs 20,000 pages long, 2,000 of which are just about connectors," he elaborates. "New employees are overwhelmed. We're building a knowledge base system that answers questions about specs. It's a tool to use for the job."

The program asks questions in six subcategories, incorporates the answers with tables and rules McClay built and can recommend parts and action in about 60% of the day-to-day situations in the electronics shop. The program is written in Prolog, runs on a Digital Equipment Corp. VAX machine and employs natural language techniques to facilitate ease of use. McClay's program is still a prototype, but the quality assurance shop is doing an evaluation, and the author hopes it will be certified and released in limited production versions by May.

Applying AI techniques

"Technology transfer is what this is about," McClay says of the associates program experience. Despite its being "tough to go back and be the ambassador of change," McClay envisions enormous possibilities in applying AI techniques to everyday work.

"At the beginning of the course you wonder how all of this is going to change your programming," McClay recalls. "Then three or four months later you're saying, 'Now I realize how important this technique is, and I have to make my management realize it so we can do some really interesting things.'

"You learn to attack the problem differently," McClay says. "It's not the tool, it's the technique and methodology that make a difference." The intensity of the relatively short course is a challenge, he adds. "A lot of it requires sitting under the tree and pondering it for a while."

Describing the ideal candidate for the program, McClay says that Boeing Computer Services must "pick a person who not just is willing but is dying to do this, because those first few weeks are 60-hour weeks. You have to want it badly."

A project may not get to the point of a sophisticated prototype, Escobedo adds. "The hope is that they will go back and, with the funding and support of their home organization, will complete it."

Another recent graduate associate, Don Kaiser, developed a program to monitor space-station cabin environments and investigate causes of change, reacting to them differently as needed instead of simply turning up the heat when the temperature drops. While of interest to National Aeronautics and Space Administration, that project isn't for Boeing to implement on its own.

Other projects

Chief scientist Wilson says other recent associates' projects include a knowledge base/expert system for airplane part design maintenance and diagnosis and one to determine air resistance and help the aerodynamicist define and evaluate parameters.

"Some will be successful, some won't," Wilson adds. "If 75% are, it's worth it."

Kowalik stresses that progress is slow, if rewarding. "One of the problems the world at large has with AI is that too much is expected too fast," he notes. "I try to warn that there is great potential, no question, but these results are not going to be obtained too soon or at low cost."

The program has drawn interest of competitors and customers, Escobedo says. "The Air Force is very interested. NASA is extremely interested in regard to the space station."

Visiting scholars welcome

Visiting scholars are invited to speak as part of an ongoing colloquium, which is open to other interested AI center employees, according to Escobedo.

Boeing Computer Services' Education and Training Division has also added several courses in AI methodology and programming languages to its general schedule, open to all employees.

"Every year, we have 20 more projects applying artificial intelligence methodology to our current problems," Wilson notes. "In the '60s, centralized computing was the focus. We try to provide the new technology push. We want to have the tools ready."

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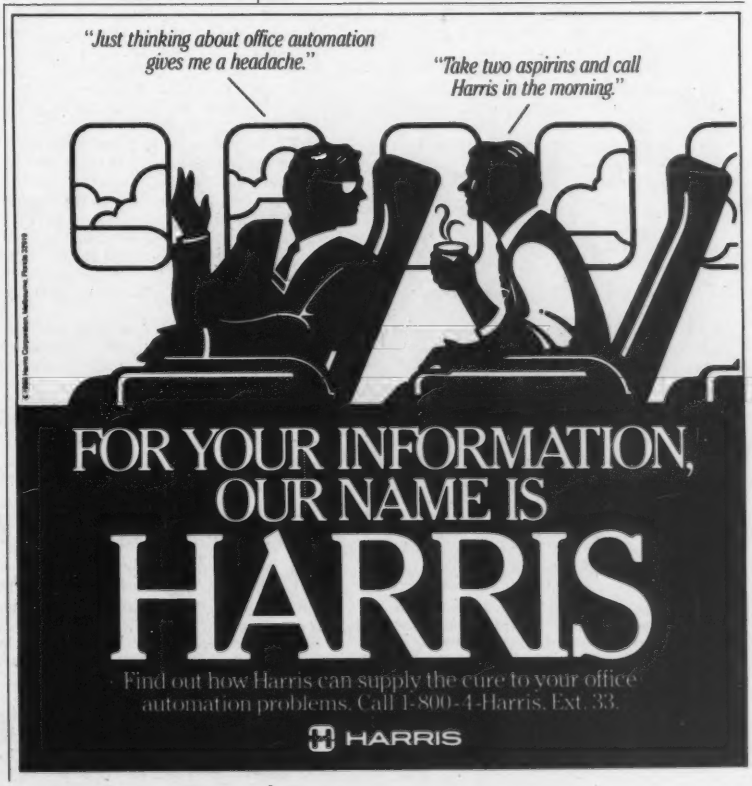
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VIEWPOINT

EDITORIAL

The slow road to standards

A computer manager from a major Northeastern financial institution stood before a throng of computer industry leaders recently and pleaded, "We need standards to do our jobs. Even *transient* standards."

When computer users begin to plead for transient standards, you know it is time for vendors to pay attention. Or else. Information processing needs have now passed the point where corporate users are willing to indulge vendors that still cling to proprietary architectures. Users not only refuse to truck with such vendors, they possess the technological wherewithal to produce effective homegrown alternatives when vendors won't budge.

Vendors sense the currents flowing, of course. They have, accordingly, made "connectivity" 1986's first semiofficial industry buzzword. And several have banded together in an organization called the Corporation for Open Systems (COS), which is designed not to set standards but to establish testing procedures whereby products can be measured against standards set by other organizations — such as General Motors Corp.'s Manufacturing Automation Protocol.

The COS concept is a good and potentially useful one. For COS to achieve its potential, however, user corporations must join its ranks en masse to influence the organization's drive for responsible standards testing. At last week's organizing meeting, two user corporations signed on with COS, while others promised action — apparently feeling that the potential benefits of shaping COS policies and priorities are worth the somewhat pricey $25,000 dues.

As a vendor-created trade organization, COS confronts the usual risk of being dominated by vendors rather than users. With users represented deep inside the organization, this is less likely — though not, certainly, impossible. We can only hope that users and vendors alike will recognize, and act to realize, COS' potential to achieve more than transient standards.

Notes & observations

Hats off to all those toiling in engineering laboratories and corporate boardrooms who made those much-discussed reduced instruction set computers (RISC) a reality. True innovation — the kind that refuses to accept the basic notion that the rules for computer architecture are cast in stone — always merits applause.

Last week Hewlett-Packard Co. took RISC innovation up a new path when it became the first manufacturer to expand an existing family of commercial products with RISC machines — machines that are designed to be compatible with existing traditional architecture products.

True innovation also spawns controversy, and this is no exception. There are those who charge that RISC systems will be inflexible, more suited for research than commercial use and outdated by the time they become mainstream. And, indeed, these critics may be correct.

For now, though, we think a word of praise is in order for those at HP and elsewhere who have expanded the dialogue in a critical area of computer technology.

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U.S. SCIENTIFIC DATA BASE

News item: Soviets gain access to Western data bases, including technology research.

LETTERS TO THE EDITOR

Star Wars technology not bug free

Praise of the presumed "Impact of Star Wars on MIS" [CW, Feb. 10] is highly disturbing. The Reagan administration fails to see that problems of war and peace require human, moral and economic solutions, not technical ones.

There may indeed be many benefits from holographic systems — though this is debatable — but Star Wars is not required for their development. Let's peg Star Wars for what it is: a vastly expensive, militarily destabilizing program. It is of a complexity that defies thorough debugging. It is not suitable for a live test, and it is able only to address a part of the nuclear threat — not cruise or submarine-launched missiles. This technology is certain to spur a new round of offensive weapons development.

We in the computer industry should have a clear understanding of the difficulty in ascertaining the reliability of complex systems and, therefore, have a responsibility to represent this understanding to the public in regard to Star Wars.

I challenge those who agree with this thinking to find peaceful programs that will spur the same levels of research, perhaps in international communications and education or in energy development and delivery.

Why can't these powerful and exciting new technologies be used to bring the world together, fostering understanding and cooperation rather than driving a larger wedge in an already dangerously fragmented global society?

Daniel A. Coleman
Data processing manager
The Village Cos.
Chapel Hill, N.C.

Forced compatibility vexes vendor

In the article "Microsoft MS-DOS strategy features Windows way of life" [CW, Feb. 10], I find it hard to believe that Microsoft Corp. has the gall to try and force third-party software developers into Windows compatibility. The consequence of not being Windows compatible, we are told, is that we may find our programs no longer compatible with MS-DOS.

I've heard good things about Windows, but I'm hardly anxious to jump on the bandwagon with a gun to my head, especially when the product was announced two years before it was released. This does not inspire confidence.

Microsoft should take a long, hard look at what happened to IBM and its Topview product. IBM, too, made the tactical error of telling third-party vendors that IBM had the total environment.

Microsoft should stick to what it knows — writing operating systems. What the world, and third-party software developers, really need is a bug-free version of MS-DOS. That would really surprise us. Microsoft and its egocentric view of the world is, perhaps, the best argument for Unix.

Michael Ceranski
Vice-president
Sophco, Inc.
Boulder, Colo.

AT&T Unix standard in circulation

We would like to thank *Computerworld* for its coverage of the Uniforum Show in the article "Unix use still in development" [CW, Feb. 10]. We take exception, however, to the assertion that there is still no Unix standard.

The industry has adopted the Usr/group standard as a foundation for Unix development. AT&T has acknowledged the standard in its introduction of the AT&T Unix System V Interface Definition and has stated that System V is upwardly compatible with the Usr/group's standard. The X/Open Group, a consortium of major European computer manufacturers, also incorporated the standard in its Unix specification.

The Usr/group has passed standardization efforts in the Institute of Electrical and Electronics Engineers, Inc.'s P1003 Committee.

One other minor correction: This was not the first time that IBM exhibited at Uniforum. The company has been at the show since 1984.

Lizabeth Reilly
Executive director, Usr/group
Uniforum program chair
Santa Clara, Calif.

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WEEKLY.

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3317-8609

VIEWPOINT

Solving the user-programmer conundrum

By AMY D. WOHL

Ask any end user what he wants out of his company's computers, and you'll hear some variations of the same theme: answers to business problems. Users don't want programs and data; they want results.

But applications development contains a classic computing problem: Only the user knows what he wants, and only the programmer knows how to make it happen. Because users and programmers don't speak a common language, the near-perfect communication needed to describe a complex, detailed project is difficult, if not impossible.

Every computer professional has heard those tired, old jokes about how the user can never tell anyone exactly what he means, needs or wants. And every end user knows the experience of waiting months — or years — for his application program to be completed, only to find that it's not at all what he had in mind.

This problem has led to an adversarial relationship — with programmers sure that end users are idiots rather than professionals whose competence is in an area other than computing, and with end users sure that programmers don't live in the real world at all.

Bridging the gap

The profession of systems analysis was designed to bridge this gap. The idea was to train a professional who is knowledgeable in what computers can do and who is able to speak the programmer's jargon in order to talk to and translate for end users.

Nonplanned iterative design, writing and rewriting programs to make them — in the end — do what the users want and need, is very costly in time and in scarce and expensive programming resources. Real iterative design, with the user involved in program specification so that little bits of the program are written and rewritten through user and programmer interaction with or without a systems analyst, is very expensive.

Enter Dan Bricklin's Demo Program. Bricklin is the inventor of Visicalc — and of the whole idea of the spreadsheet as a business metaphor. His first company, Software Arts, Inc., died in the messy disagreements between Software Arts, Visicalc's inventor and enhancer, and Visicorp, its marketer. His new firm, Software Garden, is intended to offer tools at prices low enough to make them widely usable.

Bricklin's Demo Program supports an interactive design process in which end users, systems analysts and programmers can collaborate in producing usable programs more quickly and with less wasted work than ever before.

This clever program runs on an IBM Personal Computer and permits any analyst, programmer or computer-literate end user to create screens that look exactly like programs for data entry, data query, data manipulation and analysis or report output without writing a line of code.

Bricklin's Demo Package is full of tricks to make screen layout rich, quick and simple. And changing the screen with the user looking over the analyst's shoulder, saying, "That's not exactly what I had in mind," is very easy, too, with visually oriented tools that let you move and size boxes, change text and so forth. Series of screens can be "run," making them look like a fully functional program.

With the price of a Dan Bricklin Demo Package at $75, we would expect every data processing systems analyst — and every programmer who does end-user application development — to demand a copy for his Personal Computer. Of course, this assumes that your systems analysts and programmers use Personal Computers — or at least have access to them.

WOHL STREET MINIJOURNAL

Programmers are sure that end users are idiots, and end users are sure that programmers don't live in the real world.

Our experiences with applications programs that emphasize user involvement in the design vs. programmer-intuited applications programs makes us feel strongly that user involvement is a requirement for user acceptance. Therefore, we strongly urge the use of an iterative, user-involved design model as often as possible.

Note that iterative design is not new, and Bricklin's Demo Package is not the first prototyping package around, but consider the following:

- Iterative design without a supporting environment is expensive; it requires both patience and a high degree of skill on the part of users and analysts or programmers and a commitment to throw out software until the design of the software is acceptable to both user and analyst.
- Bricklin's Demo Package is certainly the least expensive prototyper currently available, allowing end-user organizations to distribute it broadly.
- The package is extremely easy to use, permitting many end users to speed up further the design process by creating screen appearances as part of a specification document for the systems analyst or programmer.

We expect to see this program all over the place — and very quickly. And that will bring up another interesting issue: Could Bricklin be one of the few people to bring a second, entirely separate and different, highly successful Personal Computer software package into the world? So far the list of such successes is short indeed.

Clearly Microsoft Corp. has done it, with best sellers like MS-Basic, MS-DOS, Multiplan and Word. But even mighty Lotus Development Corp. has stumbled on a second real winner: Nothing at Lotus has yet equalled its standard bearer 1-2-3. Certainly not Symphony or Jazz. And one could, with justice, argue that these were mere extensions to 1-2-3 and not separate and different products.

Bricklin's TK Solver was really an advanced and very special kind of spreadsheet and far too specialized to enjoy broad market success, so it doesn't count. But Demo Package could do the trick.

Now if Bricklin would only write the next program — one that takes those lovely screens and automatically generates the software to make them happen. But that will likely need artificial intelligence, automatically connected data bases, much good luck and even more time.

Wohl is president of Wohl Associates in Bala-Cynwyd, Pa., and editor of "The Wohl Report on End-User Computing" newsletter.

The war of the words

By NILAKANTAN NAGARAJAN

The word "acronym," according to *Webster's New Collegiate Dictionary*, is a word formed from the initial letter or letters of each of the successive parts or major parts of a compound term.

A suave sales representative or a persuasive professional takes extreme delight in dropping such acronyms during discussions as an indication of his mastery of the state of the art or as a protective shield to score one against an opponent in the war of the words. A naive reader of a computer magazine will be awed by the barrage of such a baffling array of acronyms.

IBM is a household word, but I was amused to see that WNCD (*Webster's New Collegiate Dictionary*, of course) defines it as an intercontinental ballistic missile.

CHIPS will be immediately recognizable by many people as the popular TV series on the California Highway Patrol. But how many professionals associate the term with Clearing House Interbank Payments System — an electronic funds transfer system among banks?

CEO is commonly recognized to refer to the chief executive officer of an organization. Now, however, CEO represents Comprehensive Electronic Office, a product developed by Data General Corp. to support word processing, file management, spreadsheets, graphics and data base management.

READER'S PLATFORM

Likewise, everyone understands that CIO is part of AFL-CIO, the major trade union organization, even though one may not know its expansion as Congress of Industrial Organizations. But CIO in modern computer jargon stands for chief information officer.

With the rapid strides of computer technology, some acronyms are used for different concepts or entities over a period of time. Sometimes, however, they have different meanings during that same period, which causes confusion.

For example, CAI was used to represent computer-aided instruction, but nowadays it may mean computer-aided imaging or even the name of a particular firm. CAD is usually used to mean computer-aided design, but it also stands for computer-aided drafting or documentation either alone or in combination as CADD.

IC stands for — or should I say, stood for — integrated circuit. But it is also associated with information center and intelligent chip. RAF can be recognized especially by the British as the Royal Air Force, but it is being used now for remote access facility in DP parlance.

MRP was coined to represent material requirements planning, but when we found that the acronym for manufacturing resource planning would conflict with MRP, we had to be content with MRP II for the latter.

Attractive acronyms

Acronyms are useful if formed with intelligence and humor or as a target for the product in the market. Most programming languages and software packages derive their names from attractive acronyms, but the practice may tend to become self-defeating if used ad nauseum. A non-technical novice user or reader may be bamboozled by a plethora of purposeless acronyms.

MUMPS, humourously enough, represents the multiprocessing system that was developed originally for medical information in hospital management.

STD, is commonly associated with the word "standard." But the dictionary states that the term designates a doctor of sacred theology. I could not contain myself, however, when an article referred to STD as an acronym for sexually transmitted disease — a chief factor behind the epidemic of infertility in the U.S.

Nagarajan is an assistant professor of information systems at Fordham University in Bronx, N.Y.

VIEWPOINT

TURNAROUND TIME

Larry Long

***Q** Recently, we adopted a rather liberal microcomputer acquisitions policy. The way the policy is written, almost any microcomputer would be acceptable. We would like to amend the policy to identify acceptable micros by their manufacturers and models.*

In the past, we haven't been very successful in our selection of micros. Half of our current inventory is made up of micros made by companies that have gone under. Do you have an insight as to what microcomputer manufacturers will remain and thrive during the next five to 10 years?

Perhaps I can give you some food for thought. It's no secret that the future is not in single-user, stand-alone micros. Successful micro companies will focus on products that support microcomputer networks, multiuser capabilities and micro-mainframe links. Those continuing to emphasize single-user, stand-alone operation may be in trouble.

I would anticipate that IBM clones will continue to offer alternatives with inviting price/performance ratios as long as IBM allows them. Clone manufacturers are at the mercy of IBM planners. Should IBM choose to do so, it could make life very difficult for manufacturers of IBM clones.

During the last three years, a few companies have introduced what I would call truly innovative microcomputers, but they have experienced only marginal success in the fickle micro market.

Several very large and established companies may swim in red ink for the next few years, but they will survive. Small companies unable to absorb losses while continuing their research and development efforts may be in for a rough ride. The great micro shakedown will continue for at least a couple of years.

***Q** During the next 12 months, we will purchase and install about 50 microcomputers. We've selected a vendor and made all of the configuration decisions except one. We are divided as to whether to configure the micros with color or monochrome monitors.*

We have authorization to spend the extra money if we determine that the color monitors will be of value to our users. These micros will be distributed throughout our 10 user departments. We anticipate that each will run a variety of commercial software packages.

Given our situation and the trends in software support for micros, would you recommend color or monochrome monitors?

Only a handful of microcomputer software packages make effective use of color. However, I sense that software vendors are beginning to pay more attention to the fact that the added dimension of color makes for a more efficient interaction with the system. Software in development and enhanced versions of existing software that are planned for release in 1986 will undoubtedly be designed to make effective use of color.

I have talked with many users who have exposure to both color and monochrome monitors, and their overwhelming choice is color. I recommend the color monitor not because the display will be more visually appealing but because of its ability to enhance user friendliness and information dissemination.

***Q** A three-member executive committee, of which I am a member, has been formed to select a successor to the retiring director of our corporate computer center. We are currently reviewing resumes of applicants. The successful candidate will take charge of a department with more than 55 people and a budget in excess of $6 million.*

We are looking for someone with proven management abilities and are inviting applicants from accounting, engineering, manufacturing as well as data processing backgrounds. One of the candidates looks very promising. His experience with computers is as a long-time user of DP services. Do you think a good manager with no first-hand DP management experience can manage a large data processing department?

In theory, excellent managers should be able to apply their skills and make the most effective use of available computing resources. In practice, good managers with limited technical expertise often fall short of expectations. The resources available to an MIS manager are people, procedures, hardware, software and data. To tap the full potential of these resources, the successful manager must understand them, including the capabilities and limitations of available hardware and software tools. A manager that does not have a solid technical base can fall behind very quickly in such a rapidly changing environment.

I'm not saying that a former user manager can't become a good MIS manager. What I am saying is that the person making a successful transition must be well equipped to manage all of the resources, not just people.

Long, president of Long and Associates, is a consultant, lecturer and author in the field of information services. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, P.O. Box 9171, Framingham, Mass. 01701-9171.

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John McQuillan

Cultivating the hybrid network

FIRST OF TWO PARTS

What is meant by a hybrid telecommunications network? Essentially, it is a flexible or open network concept that takes advantage of a mixture of different technologies or media or even contractural arrangements. Out of all these pieces a unified network can be built.

There are at least five ways that a network can be built in a hybrid manner:

- Carrier- and customer-provided facilities.
- Carrier- and customer-based network switching, intelligence and control.
- Dedicated trunks, such as leased lines and switched public dial-up lines.
- At the media level, most especially terrestrial and satellite. Even within terrestrial, fiber optics can be combined with microwave.
- At the applications level, with voice, data and image transmissions sharing various kinds of wideband facilities like T1.

There are several driving forces causing user companies to implement hybrid telecommunications networks. In the past, companies generally built a network for a specific purpose and generally for a single application — to support bank tellers or airline reservation clerks, for instance.

But three recent trends have been moving companies toward hybrid networking. First, the large companies keep growing and finding new applications that can be automated and networked cost-effectively. They build

See **CULTIVATING** page 22

McQuillan is president of McQuillan Consulting Co., Cambridge, Mass.

DEC advances toward OSI

VAX, Microvax software implements transport layer

By Elisabeth Horwitt

MAYNARD, Mass. — Demonstrating its embrace of the Open Systems Interconnect (OSI) networking standard, Digital Equipment Corp. recently announced software that implements the transport layer of the seven-layer model on DEC's VAXs and Microvaxes running the VMS operating system.

Available immediately, the VAX OSI Transport Service (VOTS) is priced at $5,000 for Microvax, $8,300 for VAX 11/730 through 11/780 and $16,000 for an 8650. The product enables in-house programmers and software developers to write program-to-program interfaces for any two systems that use the OSI transport layer protocols, said David Korf, multivendor interconnect marketing manager for DEC's networks and communications division.

"With this announcement, DEC has started to fulfill the commitment it made last June to migrate from the proprietary Digital Network Architecture (DNA) to OSI," Korf added.

So far, according to Korf, DEC is the only computer vendor that has implemented the OSI transport layer worldwide. IBM's Open Systems Transport and Session Support (OTSS) software, which implements OSI Layers 4 and 5 on IBM 370/MVS systems, will soon be available, but only in Europe.

Korf admitted that VOTS will remain of limited value to users until other vendors come up with their own Layer 4 implementations. But, he added, this should happen quickly. "The computer companies that have joined Corporation for Open Systems realize that if they don't implement OSI they'll be locked out."

The February announcement is part of DEC's three-year plan to implement all seven layers of OSI. Korf said nothing definite about the vendor's future plans, but

See **DEC** page 22

DG package allows MV/Eclipse communications in SNA nets

By Donna Raimondi

WESTBORO, Mass. — Data General Corp. recently unwrapped a communications software package that allows DG computers to communicate with each other in an IBM Systems Network Architecture (SNA) communications environment.

The Xodiac Transport Service/SNA (XTS/SNA) Backbone communications software package integrates DG's Xodiac networks with IBM's SNA networks. The software, which costs from $900 to $5,400, depending on CPU size, supports the DG Eclipse MV family of minicomputers.

The new product should find a market among large IBM shops that want to integrate DG's distributed processing systems into their SNA networks, according to John McCarthy, research manager at Forrester Research, a Boston-based market research and data base company that focuses on Fortune 1,000 companies.

McCarthy added that XTS/SNA Backbone will allow IBM sites to replace their IBM 3270-type terminals or IBM Personal Computers with more intelligent DG terminals or with DG computers.

MV/Eclipses traditionally communicate through Data General's X.25 packet-switched network, Xodiac. XTS/SNA takes packets generated by an MV/Eclipse computer and adds code so that they can be transmitted over an SNA network, according to DG's Joe Clabby, product manager for IBM communications products.

The product requires no additional wiring on the existing network. No DG software need be installed on an IBM host.

SNA network customers will be able to use DG products such as Comprehensive Electronic Office System (CEO) software without adding new network schemes, according to Clabby. "IBM customers don't want to install duplicate networks," he

See **COMMUNICATIONS** page 22

NEW THIS WEEK

- Cincom Systems enhances Net/Master
- Northern Telecom offers its Intelligent Matrix 3000 Switch

For more on these and other new products, see pp. 67-88.

INSTANT ANALYSIS

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— William Thompson, senior planning analyst, Black & Decker, Inc., during an interview

AT&T cuts ribbon on Accunet T45 fiber-optic 'freeway'

By Eddy Goldberg

BASKING RIDGE, N.J. — Last week AT&T Communications added a 45M bit/sec. digital communications channel to its Accunet family of packet-switched transmission services. The Accunet T45 service will initially be available in 37 cities located along AT&T's fiber-optic routes.

The company said that the service will expand as new fiber-optic links are installed. It predicted that by the end of 1988 its fiber-optic network will include 120 U.S. cities.

The 45M bit/sec. "freeway" is broken down into 28 T1 (1.544M bit/sec.) "lanes." "The service offers economies of scale to companies with five to eight T1s that connect the same two points," said Grant Herrel, project manager for Accunet T45 service. He added that exact cost benefits depend on actual distances and differences in geographic location but that, generally, a customer would get about three times the capacity for the same price as five to eight separate T1 lines.

AT&T said the new service targets Fortune 500 corporations, government agencies, telecommunications vendors and other organizations that regularly transmit large volumes of voice, data and image traffic along multiple T1 lines.

Randall Sherman, vice-president of communications at Creative Strategies Research International, San Jose, Calif., said he foresees a narrower market for the T45 service primarily as a "carrier's carrier." He explained that "45M bit/sec. is an awful lot of capacity for a single company. The main market will most likely be large users and communications vendors that purchase T45 as a backbone and resell T1 channels to customers."

Sherman added that the high-speed data communications market is already crowded with satellite, microwave and fiber-optic-based transmission services. "I don't expect a heavy demand for T45 links between the two coasts, because satellite links are more competitive at distances over 1,000 miles. But for intercity communications T45 can make sense," he said.

Customer costs for the T45 service are broken down into three parts: the interoffice fiber-optic channel for 45M-bit transmission between AT&T central offices, a 45M-bit central office connection and an optional multiplexing function to allow customers to divide each Accunet T45 into as many as 28 1.5M bit/sec. circuits.

In one example of pricing provided by AT&T Communications, a customer who chooses a five-year, fixed-rate plan for service between Philadelphia and Hartford, Conn., will pay $33,245/mo plus $1,700/mo for each optional multiplexing function.

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Cultivating the hybrid network

From page 19

more and more networks until they are left with an unmanageable mess that includes dozens of data networks and often voice, facsimile and video networks as well. Hybridization — putting more than one application or type of transmission on the same network — becomes a way of making the mess more manageable.

Another core issue is that there has been a shift in attitudes. Managers are now thinking about networks that do more than replace people with machines. They want networks that increase revenue as opposed to cutting costs, that enhance the overall competitive position of the company, that increase market share or customer loyalty and that facilitate new lines of business or new kinds of service. Now they are treating networks as a corporate resource and as a long-term investment toward both known and unanticipated uses and benefits.

Need for open-endedness

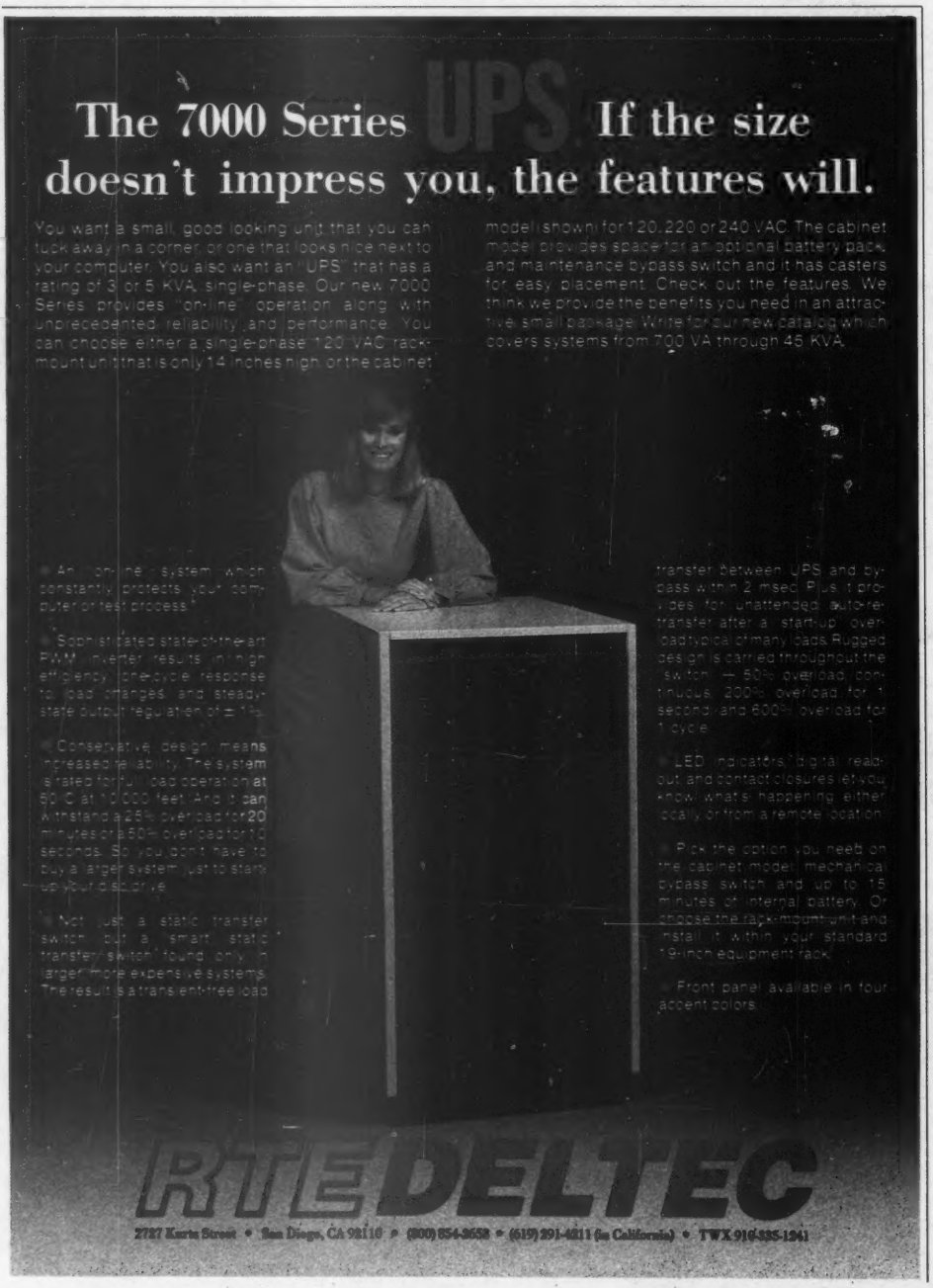
Those types of networks must be able to expand to meet unanticipated needs. They must be open-ended for future applications.

I have one client, for instance, who is bringing in a private packet network so that every terminal and computer can have connectivity with everything else in the company. The client is not sure of who will need connectivity or when or how, but he knows that connectivity will make it easier to do business better.

A third force behind the hybridization trend is the expansion of network services beyond the traditional boundaries of the corporation to include customers, suppliers, dealers, agents and so on.

As long as a company keeps its net within corporate boundaries, it retains total system control from the top down. It can choose what kinds of protocols to use and where to install the lines and terminals; it knows where everything is.

But if a company wants outside links to independent agents or dealers or suppliers — and most especially to customers — it does not have that control, that knowledge, and a hybrid network makes sense because it is flexible enough to deal with the different kinds of circumstances found outside the company walls.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DEC advances toward OSI

From page 19

admitted, "We're climbing up the OSI tower, so the next step is obvious." That is likely to be Layer 5, which defines how sessions are established and controlled between two communicating computers.

DEC OSI front-runner?

David Terrie, president of Boston-based Newport Consulting and editor of The Seybold Group's new publication, "Network Monitor," questioned whether DEC is the front-runner in the race to implement OSI.

"Hewlett-Packard Co.'s most recent networking software release uses the OSI transport layer. In fact, HP's network architecture *is* ISO," Terrie said.

"DEC has a huge installed base of companies committed to DNA, and DNA has a huge number of features that may or may not translate to OSI. Decnet and IBM's Systems Network Architecture are the only two de facto standards that are likely to stand out from OSI at the systems level, aside from Netbios for IBM PC networks," he added.

Korf hedged when questioned about DEC's willingness to conform to other manufacturers' high-level communications protocols — IBM's Document Interchange Architecture/Document Content Architecture, for example: "There are several possibilities, including our own and Wang Laboratories, Inc.'s," he said.

He also said that DEC's three-year plan is for DNA to be compatible with, not replaced by, OSI. "We won't give up DNA's added functionality. Users can choose between the two or implement them both on the same network."

Communications tool out from DG

From page 19

said, "but I think they are starved for good, solid processors in the departmental range."

Aimed at European customers

CEO Document Exchange VI, announced the same day, is aimed at Data General's European customers.

The hardware and software product allows CEO office automation system users to send messages, documents or charts directly from their workstations to other terminals throughout the world via public nets that use CCITT's Teletex standard.

The document exchange is supported under DG's AOS/VS operating system and requires the $5,000 DG Teletex Adapter Unit, Model 4554.

The product costs from $750 to $4,500, depending upon CPU size.

Clabby expects the product to be used primarily in Europe at this time, because the U.S. has not yet accepted the Teletex standard.

He predicted, however, that the Teletex standard will be accepted in the U.S. within three years, because it uses faster transmission rates and a wider character set than Telex yet costs less.

MICROCOMPUTERS

SMALL TALK
Eric Bender

Glory days & DP demands

"For the first time, I think, we all understand what's going on. That's better than when the company is growing at 60% to 70%, and we don't know why."

Such was Apple Computer, Inc. Chairman John Sculley's capsule summary of the industry at last month's Personal Computer Forum in Phoenix.

Sculley arrived at the forum in a white stretch limousine, two Apple Macintoshes and a retinue of busy aides, but he didn't seem to be having quite as much fun as most other attendees. And many sounded as if they disagreed with the second part of his assessment, fondly recalling the early sunny-sky days.

The forum also spotlighted the widening gulf between two extremes of microcomputing — its truly "personal" computing roots and large corporation information processing — personified, respectively, by Philippe Kahn, Borland International, Inc. founder, and Robert Berland, IBM's director of strategic planning.

Kahn, who arrived on the heels of a *USA Today* interview in which he spoke disparagingly of the conference, cheerfully tossed soft-spoken verbal bombshells throughout the sessions. At one point, sitting next to Ashton-Tate President Edward Esber, Kahn blamed software price drops on "software companies going public — at the end of the quarter they want to make their numbers." Esber replied smilingly that "it's a competitive way to use a distributor's credit line on your product."

Kahn also remarked on some recent successes for his firm's low-price, unusual product strategy. The most recent: Borland has sold 200,000 copies of the Reflex data analysis package, presumably making Reflex one of the top five micro data base management system offerings of all time.

IBM's Berland seized the moment to deliver a series of minilectures on the need to educate users and to provide them with smoothly integrated software. "We've heard about hardware, software, firmware and vaporware, but what we ought to be focusing on is underware" that invisibly ties functions together, he declared.

Pushing this metaphor to its limits — or beyond — Berland called for "cooperative processing, with transparent underware between two consenting applications." He also underlined the requirement this move will create for strategic alliances between vendors and concluded with an appeal to developers: "We need you badly."

"You may need us badly, but the problem is we don't need you badly," responded one software developer who

See **GLORY** page 24

Bender is Computerworld's *senior editor, microcomputers.*

RAM graphics tool debuts

Graphs created from on-screen applications

By Douglas Barney

GREENWICH, Conn. — New England Software last month introduced Graph-in-the-Box, a $97.60 application claimed to be the industry's first random-access memory (RAM)-resident graphics program. The product enables users of IBM Personal Computers and compatibles to create charts and graphs from any on-screen application in 5 seconds, company President Alf Petersson said.

The package's residence in RAM allows users to call it up and create graphs without swapping disks, exiting the current application or creating intermediate files. Graphs can be generated from any application, including spreadsheet, data base or word processing programs.

Graph-in-the-Box can be called up with a single keystroke. The user defines the area of the screen to be graphed, and the product then captures data from the screen and transforms it into a column chart that is already scaled and labeled.

Users also can use an icon menu to choose a variety of chart forms including bar, stacked bar, column, stacked column, line, step, scatter, pie, mixed and exploded pie in a variety of colors and textures. The product can handle up to 500 observations and 15 variables. Once the chart has been formed, users can change captions and titles, fill patterns, add gridlines or change the scaling.

The product works with all major graphics display boards, laser and dot matrix printers and Hewlett-Packard Co. and compatible plotters. It also runs concurrently with other RAM-resident programs.

Graph-in-the-Box requires 128K bytes of RAM and does not require color graphics. The program is copy protected, and one backup copy can be made. A non-copy-protected version for site licensing is expected shortly.

CD-ROMs to expand desktop use

By Eric Bender

PHOENIX — Compact disk read-only memory (CD-ROM) players, which industry analyst James Porter of Disk/Trend, Inc. called "a free gift from the consumer electronics industry to the computer industry," will support radically new desktop applications, software luminaries agreed at the Personal Computer Forum.

Along with the ability to store roughly a thousand times the capacity of today's floppy disk drives, CD-ROM players "allow you to browse that data in so many ways," commented Microsoft Corp. Chairman William Gates. He added that "the applicability to the office workplace is not clear" and gave an estimate of 10% penetration on business desktops by 1990.

Among the likely consumer possibilities are a multimedia encyclopedia that would provide a combination of textual, graphics, video and audio information. This week at its CD-ROM conference in Seattle, Microsoft plans to give away disks demonstrating some examples.

At last month's forum, Activenture Corp. Chairman Gary Kildall and Borland International, Inc. President Philippe Kahn also spoke enthusiastically about the promise of CD-ROMs.

Borland originally became interested in the technology during development work for Turbo Lightning, Kahn said. "By the end of the year, we will have several releases of CD-ROM products."

Earlier this year Kildall's start-up began selling the first CD-ROM consumer product — a player bundled with an electronic version of Grolier's Academic American Encyclopedia. Kildall commented that "if people don't like encyclopedias, they

See **CD** page 24

Laser printer add-on for Displaywriter unveiled

By Peggy Watt

SANTA CLARA, Calif. — Advanced Technologies International, Inc. has announced an add-on intended to let the estimated 400,000 IBM Displaywriters still in use take advantage of laser printer technology.

The Laserprint 800 connects directly to the standard Displaywriter printer port, emulates the IBM 5218 daisywheel printer and communicates with the Canon USA, Inc. LBP-8 laser printer, according to President Ray Newstead. The system costs $4,995 with controller and laser printer, with optional feeders for envelopes or additional pages.

As with standard Displaywriters, only three word processors can share a printer, but future Advanced Technologies International products will expand that capacity, Newstead said.

The laser printer's increased text capabilities, such as added fonts, reverse or shaded print and graphics, can now be used by Displaywriters with embedded text commands.

"IBM is not supporting the Displaywriter with gateways to new technology, which gives us the opportunity to come in and add value," Newstead said.

DCA upgrades Irma

File transfer, keyboard enhanced

By Rosemary Hamilton

ALPHARETTA, Ga. — Digital Communications Associates, Inc. (DCA) said it has expanded the capabilities of both its Irmalink FT/3270, a file transfer program that allows the Irma board to interface with the IBM 3270 PC File Transfer program, and its Irmakey/3270, a programmable keyboard that combines IBM 3270 keys with IBM Personal Computer keys. Both products sell for the same price as the older versions.

Irmalink FT/3270 now supports IBM's Personal Services/PC (PS/PC), a software product that links to IBM's Distributed Office Support System, allows communications with other PS/PC users and supports certain word processing programs The PS/PC support requires 320K bytes of internal memory, an Irma board running the E78 terminal emulation program and PS/PC. DCA will sell the product under three licensing agreements: $115 for a single user, $2,500 for a single-host and $7,500 for a multihost environment.

The Irmakey/3270, which sells for $329, now includes support for the IBM Personal Computer AT. Upgrades to the Irmalink/3270 are free to customers who have a single-host or multihost license.

NEW THIS WEEK

- Sintec offers an IBM Personal Computer XT-compatible system
- Compucorp introduces the Connection workstation

For more on these and other new products, see pp. 67-88.

INSTANT ANALYSIS

Will Compaq Computer Corp. introduce an Intel Corp. 80386-based system before IBM? "We don't know the answer. . . . We're not waiting for IBM on anything."

— Rod Canion, president, Compaq

Glory days and DP demands

From page 23

had heard enough about large corporation needs for one week. Camilo Wilson, founder of Lifetree Software, Inc., emphasized that many developers would rather concentrate on stand-alone personal computers.

Corporate Software, Inc. Chairman Mort Rosenthal asked Berland why IBM couldn't solve the problem itself, as Big Blue employs more programmers than the entire personal computer industry. "Yes, but you've got to look at strengths," Berland replied, to widespread laughter.

Also at the forum, Microsoft Corp. gave another example of the growing split between personal and corporate computing.

Microsoft flying high

Founded by minors, Microsoft now is flying high as its initial public offering approaches. But developers are complaining that the software powerhouse has begun to make a few too many power plays. They mentioned one case in particular: To create applications for future Microsoft MS-DOS machines, the company suggests that developers work within Windows standards, which basically translates into a need to buy the firm's languages.

Some other notes and quotes:

• Emerging communications standards such as IBM's LU6.2 attracted some discussion, although Compaq Computer Corp. President Rod Canion cautioned that "in the world of today, they don't really exist."

While a call for hands among software suppliers currently working on LU6.2 products drew few responses, Lotus Development Corp. Chairman Mitchell Kapor said that did not indicate a lack of interest. "It's just a bit premature," he said.

However, Tom O'Leary, director of MIS technology at North American Philips, commented that "I don't think it's premature; I think it's hard. If any of you are not thinking about cooperative processing, your worth to us is short term."

• "I don't think U.S. businesses are as concerned about buying non-IBM PCs as they were two or three years ago," O'Leary stated. "We're acquiring more and more non-IBM PCs, and price is not the reason."

He listed three main reasons: good relations with vendors, better price/performance and "finally, and the most important, we don't like the terms and conditions from IBM."

• "IBM has an invention that allows us to attack ourselves, and it's called an independent business unit," remarked W. Frank King, group director, IBM advanced engineering system development. The latest such "attack," the RT Personal Computer, was the subject of much speculation at the forum.

With its IBM logo, advanced technology, Unix-based software and Personal Computer AT-standard bus, the RT PC represents "an opportunity for the store channel to move upward," proclaimed Alan Hald, chairman of Microage Computer Stores, Inc.

Whether the RT PC will accomplish that, King remarked, its performance definitely will move upward "an order of magnitude faster over the next two years."

• Despite some advice that artificial intelligence technology is more likely to flavor current applications than replace them, Daniel Bricklin, author of Lotus Development Corp.'s Visicalc, suggested that such a concept is misleading for some emerging software categories. "That's sort of like thinking about building a hamburger out of Lawry seasonings," he said.

• From a computer retailer's point of view, IBM's moves to slow dealer expansion and to crack down on the gray market "are too little, too late," said Computerland Chairman Edward Faber. "There will not be fewer distribution channels for the product. There will be more; they'll just be unauthorized. . . . Was this all part of a plan, or was IBM incredibly stupid? IBM's not stupid. Look at the results."

• Last year Lotus was approached by literally a thousand software firms wanting to be acquired, venture capitalist Ben Rosen commented.

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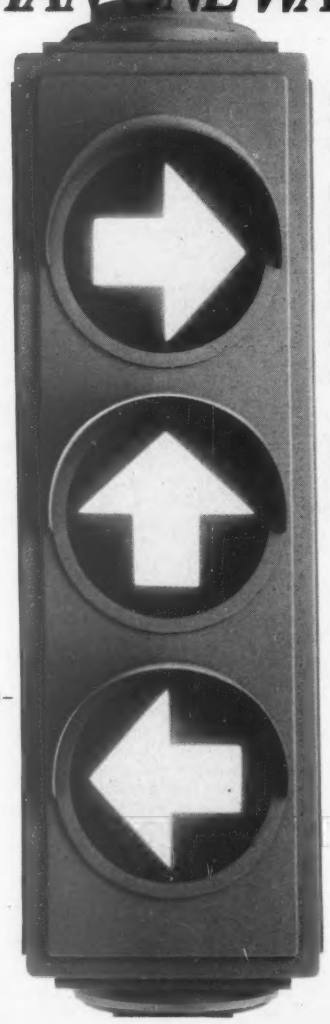

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CD-ROMs to expand micro use

From page 23

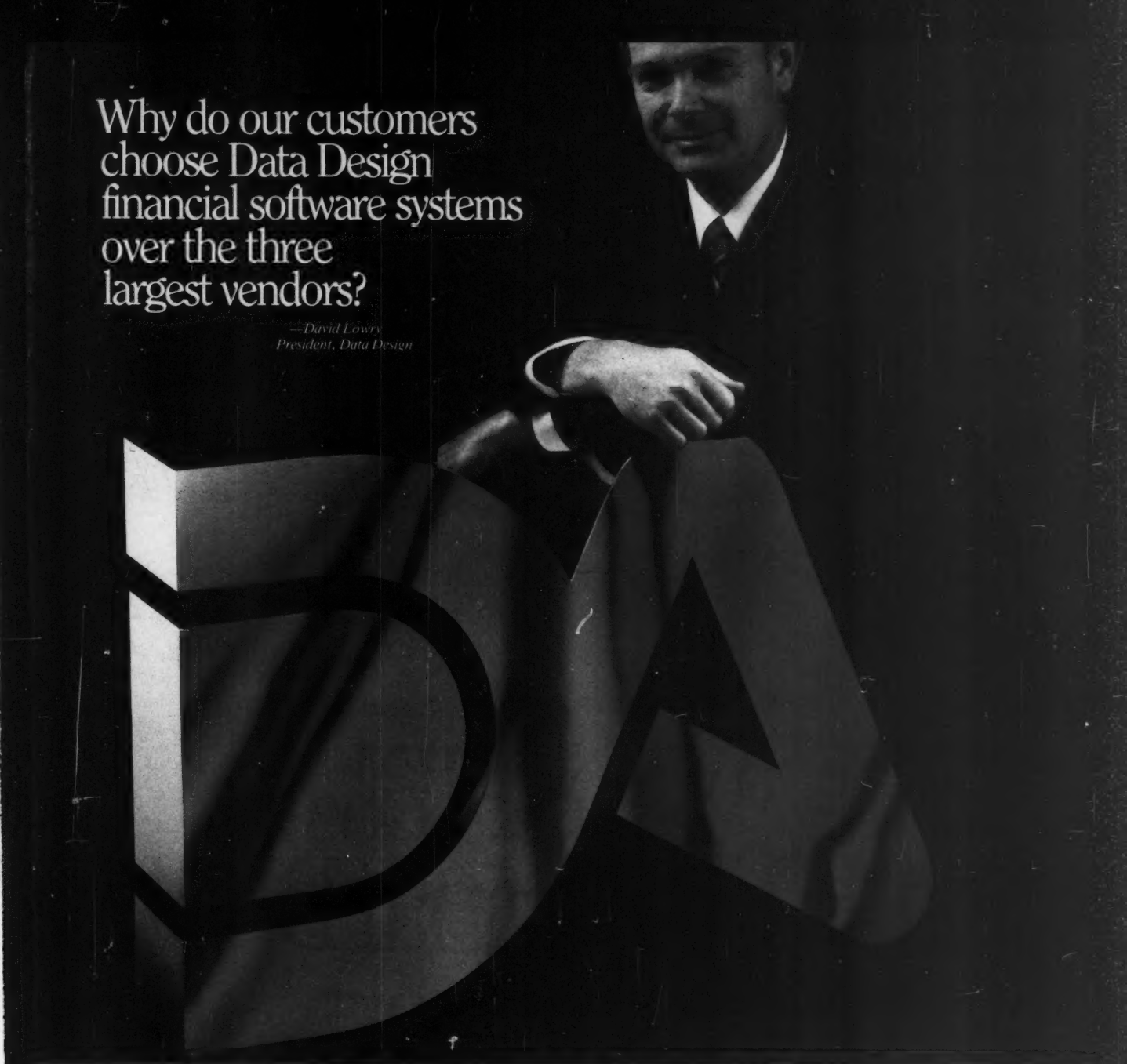
probably won't like anything." He also predicted that on-line data services "aren't going to last a long time when CD-ROMs come in, at least as far as historical data is concerned."

While there is much talk about CD-ROM standards, many are already in place, these developers pointed out. "The things we need standards on are the audio format and the video image formats on disk," Gates said.

Kildall noted that CD-ROMs lack an industry standard for file formats. "But because it's read only, it's not really imperative that we get this today. . . . As far as the consumer is concerned, there is no problem at all."

CD-ROMs originally were based on audiodisk technology that had been optimized for sequential access. Kildall predicted that drives will evolve into two types, divided by price and performance.

Another critical factor is copyright protection. "Book publishers are really scared; it's understandable," Kahn said. "They've got their entire data base on a disk that could go to Taiwan," Kildall commented.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SOFTWARE & SERVICES

SOFTALK
John Gallant

Getting goods on-line on time

Last year was one some players in the large systems software industry would probably like to forget. But 1985 was also a year in which most vendors lived up to the delivery promises they made for new products.

Maybe it was user backlash to vaporware — announced but undelivered software. Maybe it was highly publicized instances of key vendors failing to deliver major, announced products on schedule. Whatever the reason, it seems that vendors made a real effort to ship on time the important new systems they unveiled in 1985.

Not surprisingly, IBM led the pack last year with the introduction of a variety of major software systems. And, at least according to IBM, Big Blue did a pretty good job of delivering on those product promises. The Cobol Structuring Facility announced in November was delivered in January, as planned. Both artificial intelligence development tools unveiled in August — the Expert System Environment/VM and VM/Programming In Logic — were generally available according to schedule in September. Release 1.7 of CICS, promised for the fourth quarter, was available in December.

VM/XA, an IBM spokeswoman said, actually shipped three months ahead of schedule. The operating system was introduced in February along with the 3090 series processors and was made generally available in August. VM/Entry, also announced in February, began

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Gallant is Computerworld's *senior editor, software & services.*

TAB shifts development, data base to the desktop

Programmer tool mimics Cullinet's ADS/On-Line

By Charles Babcock

NEW YORK — Early users of a start-up company's programmer workbench say the product relieves contention for mainframe resources by shifting applications development tasks to a microcomputer.

The Application Builder (TAB), from Online/Database Software, Inc. of Pearl River, N.Y., successfully mimics Cullinet Software, Inc.'s ADS/On-Line development environment on an IBM Personal Computer XT or AT, beta users say. A production version of the $3,500 package is being manufactured and will be in the hands of users soon, according to Bruce H. Loeffel, vice-president of Online/Database.

TAB was designed to generate applications on a micro that will run against Cullinet's IDMS/R mainframe data base management system after being uploaded to the mainframe. According to H. Michael Braude, director of Gartner Group, Inc.'s Software Management Strategies Service, TAB is "the first instance of a data base and application development environment being ported, with reasonable completeness, to the desktop."

Robert S. Perlmutter, assistant manager of technical services at ITT in New York, an early user of the product, says TAB helps reduce conflict among programmers using ITT's development mainframe. "Programmers tend to get in each other's way testing the same system. . . . One problem is contention for the data dictionary," he notes.

ITT is beta testing TAB because it is eager to gain the advantages of shifting development work to micros. "If one programmer corrupts his data base in a micro environment, it doesn't matter; the others may continue working," Perlmutter says.

> ***"ITT is beta testing TAB because it says it is eager to gain the advantages of shifting development work to micros."***

Applications development can be such a resource hog that downloading the job to micros "might even delay your CPU upgrade," says Colin Moore, vice-president of Sysmith, Inc., a Marina Del Rey, Calif., IDMS consulting firm.

A mainframe programmer can also develop an application for a microcomputer, download it to a TAB-running micro and process it through TAB's syntax converter. The result is an ADS/On-Line application that has been converted into a micro application, Perlmutter says. If it does not require TAB's data base management system (DBMS), it can run independent of TAB on any Microsoft, Inc. MS-DOS-based micro, he says.

The development language in TAB is a near duplicate of Cullinet's ADS/On-Line high-level development language in TAB, Perlmutter says. "It is 99% compatible with the mainframe system," he says.

In addition to the language, TAB has an IDMS-style DBMS, with screens that allow a programmer to enter mapping definitions from IDMS into the TAB microcomputer environment, a data dictionary, menu-driven dialogue generator, utilities such as a text editor that supports INSERT/DELETE/CHANGE commands and a syntax converter.

The program segments are controlled by an operating system that gives the user access to IBM PC-DOS and MS-DOS functions and applications, according to company spokesmen.

The syntax converter takes TAB-developed applications code and translates it into code that can be compiled into IDMS ADS/On-Line code under IDMS utilities, Perlmutter says. TAB can also take IDMS ADS/On-Line programs and convert them

See **TAB** page 30

NEW THIS WEEK

- Applied Data Research upgrades ADR/PC Datacom
- NASA offers the Cerberus knowledge-based system

For more on these and other new products, see pp. 67-88.

INSTANT ANALYSIS

"Artificial intelligence is probably the world's most difficult technology. We don't even know what the core technology is. Today's tools are thin, weak and full of cracks."

— Carl Hewitt, professor, MIT Artificial Intelligence Laboratory, on the state of AI

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Getting goods on-line on time

From page 29

what IBM calls a phased buildup — limited availability — in June and was made generally available in December as planned.

Only IX/370, the AT&T Unix System V implementation running under VM, seems to have slipped past the schedule that IBM outlined in its February announcement of the product. Originally slated for general availability in October, IX/370 began a phased buildup in November and is not yet generally available.

The spokeswoman would not comment on when IX/370 will move beyond limited shipments. She said IBM still plans to deliver both IMS/VS 2.1 and Displaywrite/370 according to schedule.

IMS/VS was promised for first quarter 1986 availability. Displaywrite/370 will have to be released before this piece is published in order to meet its February shipment timetable.

Meeting shipping schedules

Applied Data Research, Inc.'s Release 7.4 of Datacom/DB and its DL/1 Transparency system both went out on schedule in August. McCormack & Dodge Corp. also met shipment dates for its AR:Millennium accounts receivable system and the second version of its Millennium development environment.

Other vendors delivering on time included Prime Computer, Inc., Relational Technology, Inc. and Martin Marietta Data Systems. Prime's Primix implementation of Unix went out to a selected group of customers in July and was generally available in November.

Relational Technology's Ingres/CMS was available in October, as planned, and Martin Marietta's Unison workstation software and Consensus development system were delivered on schedule.

CCA rates '50-50' in delivery

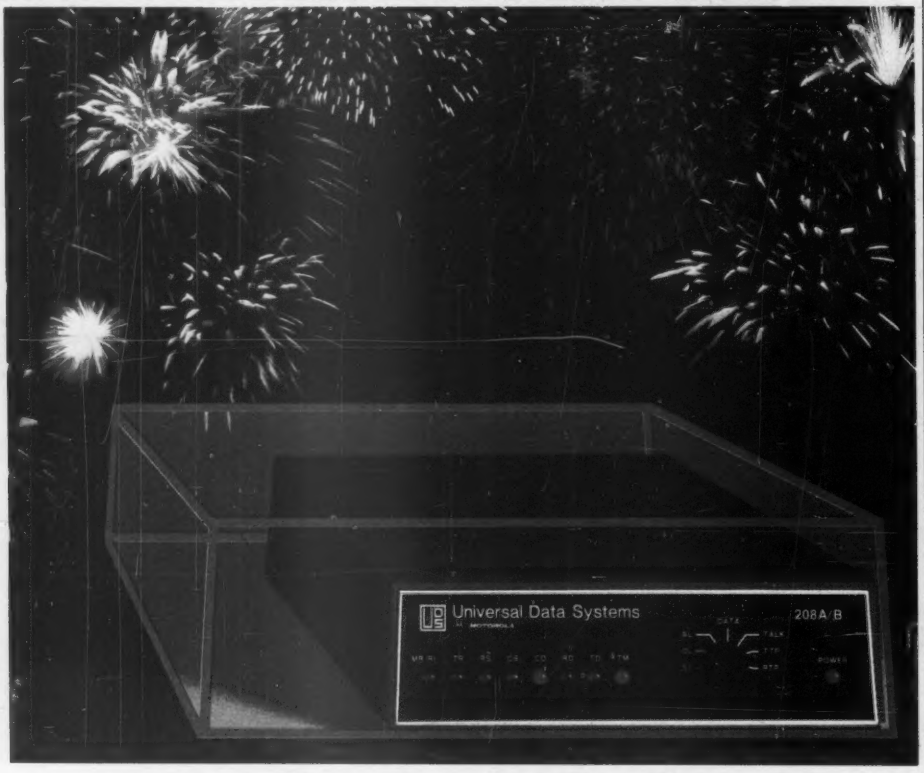
Computer Corporation of America (CCA) said it was "50-50" in delivering announced products last year. Release 2 of its PC/204 product and Release 8.1 of its Model 204 data base management system were shipped as planned. But CCA is still working to get its PC/Workshop and Release 2 of its Workshop/204 products out the door.

A spokeswoman said the delays were due to time-consuming modifications to the data dictionary component of the products. Release 2 of Workshop/204 will ship by the end of March, she said, and PC/Workshop will ship by the end of April.

In the realm of integrated data center management software, Computer Associates International, Inc. made good on its summer shipment promise for the CA-Unicenter system.

Uccel Corp., which unveiled its Synova series of integrated systems software just one day after Computer Associates introduced CA-Unicenter, shipped the initial component of Synova — Nova:Log — according to schedule.

Although the products mentioned here are just a sampling of the major software systems introduced in 1985, it seems clear that vendors are striving to get systems out the door on time. That strategy can only build user confidence and give a boost to an industry that already has plenty of other problems to surmount.



Design refinements cut size, cost and power consumption for 4800bps modems

Additional LSI miniaturization in UDS' 208A/B modems has produced significant performance improvements, along with dramatic reductions in size and power consumption. The 208A/B can be strapped as either full-duplex, four-wire (half-duplex, two-wire) over dedicated lines or half-duplex on the dial-up telephone network. It is now available in the "minibox" package. The result: a 54% reduction in volume. The 208A/B is also available in space-saving OEM card configurations.

DC power consumption has been reduced to approximately 2W. Other performance improvements include:

- Compatibility with *all* currently available 208s.
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Created by Dayner/Hall, Inc., Winter Park, Florida

TAB shifts development

From page 29

into TAB-recognizable code. The syntax converter follows security procedures that are compatible with IDMS and converts TAB data dictionary entries into the IDMS data dictionary format, company officials say.

The package does not have a micro-to-mainframe link even though it is intended to shift applications between the two, Loeffel says.

A client of Sysmith, an IDMS user, says it plans to employ 100 programmers on a long-range development project. When Moore asked Cullinet about an IDMS programmer's workbench, the software vendor referred him to TAB's developer, Online/Database Software.

To evaluate its DBMS capabilities, Moore set up a stress test with 364 records, each with 5,800 elements.

'Response times did not vary'

"TAB did not deteriorate as we went further and further down the list" establishing the data base, Moore says. "Response times did not vary more than a couple of seconds either way," he says. The test exceeded the demands that will be made on the DBMS under design for his client, he adds.

Perlmutter says his version of TAB has performed the functions well on ITT Information Systems' Xtra/XP personal computer, which runs MS-DOS. He has built two test applications with TAB, one in personnel and one in inventory.

Cullinet Software officials decline to comment on TAB. A beta user who asks not to be identified says Cullinet indicated to him that it has no competing product under development.

TAB is written in the C language, and Online/Database Software officials say they plan to have Unix and Microsoft Xenix versions available later this year.

TAB can run on an IBM PC-DOS or MS-DOS compatible provided it has 640K bytes of memory and at least a 5M-byte hard disk, Loeffel says.

SYSTEMS & PERIPHERALS

HARD TALK
James Connolly

Good service, greater needs

"The more you can give me, the more I want." That seems to be the finding of a recent survey on computer systems service.

It is not good enough that most large-systems vendors improved their service in 1985. User expectations and demands grew even faster.

Input, a Mountain View, Calif., computer industry and telecommunications research firm, surveyed users of nine vendors' large systems. The result was Input's realization that there is a surprisingly high level of user dissatisfaction with mainframe service.

Complicating the problem is the fact that users were most dissatisfied with the highest priority service needs, such as parts availability, software and hardware maintenance and engineer skill levels.

The fact that those areas are of the highest priority should not be so startling. Each of those areas is intricately related to both time and system availability.

In addition, it probably should not be surprising that users are most upset with those portions of their service.

It is problems such as a delay in the shipment of a replacement part or a bumbling service engineer that a user — as well as the user's boss — will remember. It is that type of problem that burns a hole in the manager's stomach.

The less crucial or less time-dependent services mentioned by Input's respondents included areas such as consulting, documentation and training.

Input asked users to rate services from one to 10 in terms of importance, with 10 carrying the highest priority. Engineer skills, hardware maintenance

See **GOOD** page 32

Connolly is Computerworld's *senior editor, systems & peripherals.*

New directions: Gambling on RISC-based architecture

By Donna Raimondi

Reduced instruction set computers (RISC) — claimed by their designers to be at least twice as fast as conventional computers — are sprouting up in the marketplace. IBM started off 1986 by announcing its RISC-based RT Personal Computer, and Hewlett-Packard Co. last week unveiled its Spectrum series of RISC-based systems.

RISC processors are said to run from two to four times faster than conventional, complex instruction set computers because they execute a smaller set of instructions. Their simpler architecture allows faster computing, and RISC units may also be less expensive.

But the idea of RISC is complicated, and the technology could even become obsolete before it is widely developed, a number of RISC watchers say. Experts contend that the real value of RISC to developers is that it has focused attention on instruction sets and livened the dialogue as to what makes a good set.

> ***The idea of RISC is complicated, and the technology could even become obsolete before it is widely developed.***

Many of the instructions found on a complex instruction set machine can be eliminated on a RISC system, according to Ridge Computers, Inc.'s director of CPU development, Chip Pessa. Ridge was one of the first companies to make a RISC-based line of computers. The instructions include variants of memory referencing instructions; esoteric instructions such as IBM's ZAP, which are designed for one or two specific applications; and extended precision instructions that support 128-bit words but that are rarely needed.

RISC is a better architecture for compute-bound applications than it is for transaction processing, Ridge's Pessa says. "You gain more from specialized instructions in the transaction processing environment." The instructions are typically optimized to be completed within one machine cycle, and they operate from register to register within a CPU, accessing main memory with simple LOAD and STORE instructions. Mathematical instructions are simple, too, such as COMPARE and ADD.

RISC refers not just to the number of instructions but also to the simplified address process for fetching instructions and operands from memory and to the simplification of complex instructions.

Variables, temporary variables and constants are stored in register stacks in the processor, thereby reducing memory use. Instructions are generally of one size, making for predictable code sequences that help to maintain constant execution times and an even flow in the pipeline.

RISC research started in the 1970s when IBM studies showed that the bulk of a computer's time was spent loading data from memory into registers and restoring those in memory. Studies revealed that many instructions were used infrequently.

The University of California at Berkeley developed the RISC I and RISC II projects that tried to reduce instruction sets to the minimum number needed, and Stanford University joined the RISC research efforts with an attempt to reduce pipeline contention problems. These pure RISC machines are not commercially available anywhere. To be useful, they need more instructions and hardware such as floating-point processors and memory management schemes.

Companies like Data General Corp. and Digital Equipment Corp. have experimented with RISC concepts and found them wanting. At the December announcement of the VAX 8650 processor, Ken Olsen, president of DEC, said the company has not been successful in making a RISC machine that is as good as its other CPUs.

The reality of RISC systems is that their perceived superiority over traditional architectures is questionable, contends analyst Will Zachmann, who follows new technology for International Data Corp. RISC systems may use simpler CPUs, but they require more complicated software and hardware elsewhere in the system, he points out. RISC-optimizing language compilers, task switching within the system and LOAD and STORE operations that RISC uses can obliterate the architecture's advantages.

See **GAMBLING** page 32

NEW THIS WEEK

- Harris introduces Harriscad systems
- DEC announces Vaxlab real-time workstation

For more on these and other new products, see pp. 67-88.

INSTANT ANALYSIS

"I think IBM decided it could not afford to lose that middle range to the minicomputer vendors."

— Dale Kutnick, independent analyst, on the restructuring of the IBM 4381 line

Floating Point enhances, expands scientific computer line

Series 64 gets Unix, C compiler, processors

By James Connolly

BEAVERTON, Ore. — Enhancing and expanding its family of scientific computers, Floating Point Systems, Inc. recently announced two processors and the availability of Unix, a C language compiler and a solid-state storage device for the 64 series of systems.

The systems are the FPS-264/20 and the FPS-364/Max, which is the second Floating Point product to feature matrix algebra accelerators. Those accelerators allow matrix algebra calculations to be replicated in main memory on very large-scale integration hardware. The initial accelerator product, the FPS-164/Max, was announced in 1984 and featured less memory, fewer peripherals and fewer accelerators.

The FPS-364/Max was designed for use in structural analysis, computational chemistry and physics. It supports up to eight accelerators and performs up to 187 million floating-point operations per second (Mflops). It will be available in April at a price of $401,000 for a system with 500K words of main memory, one accelerator, one disk drive with controller and software including the Fast Matrix Solution Library.

The FPS-264/20 is targeted to various industrial, government and academic applications.

According to the company, the system has a peak performance of 20 Mflops and a base price of $460,000. The system was designed to be upgraded to the existing 38-Mflops FPS-264. The FPS-264/20 will also be available in April.

The Unix option will provide Floating Point's installed base and new customers with an AT&T Unix System V environment while the C compiler was designed to provide greater processing speed and user efficiency in graphics applications and computer-aided design and computer-aided engineering circuit design and testing programs.

The solid-state disk option is the company's first solid-state device. It features a memory capacity ranging from 128M bytes to 15.75G bytes with a logical disk controller and a 44M byte/sec. transfer rate.

The Unix option will be available in September, the solid-state device in October and the C compiler in November.

Gambling on RISC systems

From page 31

Among those who disagree with Zachmann is Robert Ragan-Kelley, vice-president of architecture and planning at Pyramid Technology Corp. Ragan-Kelley helped develop one of the first commercially available RISC-type machines. It is true that with a small register set LOAD and STORE operations can minimize the advantages, but with the overlapped registers favored by RISC developers like Pyramid, that is a fallacy, he says.

"It turns out that with the overlapped register approach, compilers are very simple," Ragan-Kelly continues. Users do not care what the compilers look like, anyway, he says, and the user/programmer finds that it is easier to generate code on a RISC system because there is only one way to do it. As far as task-switching is concerned, "We are trading off something that happens once in a while," he adds.

The development of software is a little more difficult in the beginning of a RISC project, Pessa says, but once compiler designers get used to the smaller number of building blocks, they start coding more efficiently.

RISC-optimizing compilers make efficient use of a uniform and fast register set and work best with simple instruction sets. The compilers take normally programmed software and translate it into machine language, so the differences are transparent to the user, Pessa says.

Task switching is done for transaction processing applications and not for the compute-intensive operations that are more likely to be performed on a RISC machine, he adds.

Transistor-transistor logic

The benefits of the attention being given to RISC have not been lost on Harris Corp. Harris designers were able to use transistor-transistor logic instead of the more expensive emitter-coupled logic on their HCX-7 computer because of the reductions in the instruction set they made after studying RISC concepts, says Lyle Plitt, HCX-7 product manager.

Harris used RISC concepts to cut a traditional DEC VAX-11/780-type operating system, with 300+ instructions, down to about 160 instructions. The resulting system is not a RISC, Plitt says, but "RISC studies showed some interesting things that we wouldn't have seen otherwise."

In a C language study, Plitt discovered that the CALL-RETURN sequence represented 12% of statements, but it was responsible for one-third of machine instruction time and almost half of the memory references. He was able to design one hardware instruction to do those sequences.

Using RISC may be faster than using today's machines, but that speed will be more easily achieved by means of another developing technology — parallel processing — in the near future, says IDC analyst Dave Moschella. A parallel system using RISC concepts may be the best solution of all, but nobody is working on that combination, he adds.

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Good service, greater needs

From page 31

and parts availability all scored 8.8 or higher. More than half of Input's respondents said they were dissatisfied with those three services and with software maintenance, which carried an importance rating of 7.8.

Parts availability grew worse

A problem like parts availability grew still worse when Input looked at vendors that had recently introduced products and hurt their own logistics.

The least crucial service, consulting, earned a 70% positive satisfaction rating but only a 6.3 rating in terms of importance.

Input's conclusion was that even improvements in the low-priority areas will have little impact on the user's overall perception of service.

User dissatisfaction

Another surprise for Input was the degree of user dissatisfaction with hardware service in light of the increased reliability and system availability of large systems.

Only IBM and National Advanced Systems Corp. scored better than 50% in the area of hardware support.

Even companies that improved hardware support did not necessarily boost their overall service ratings from their 1984 ratings, and some saw their overall rating improve despite falling hardware ratings.

High-priority, high-visibility services

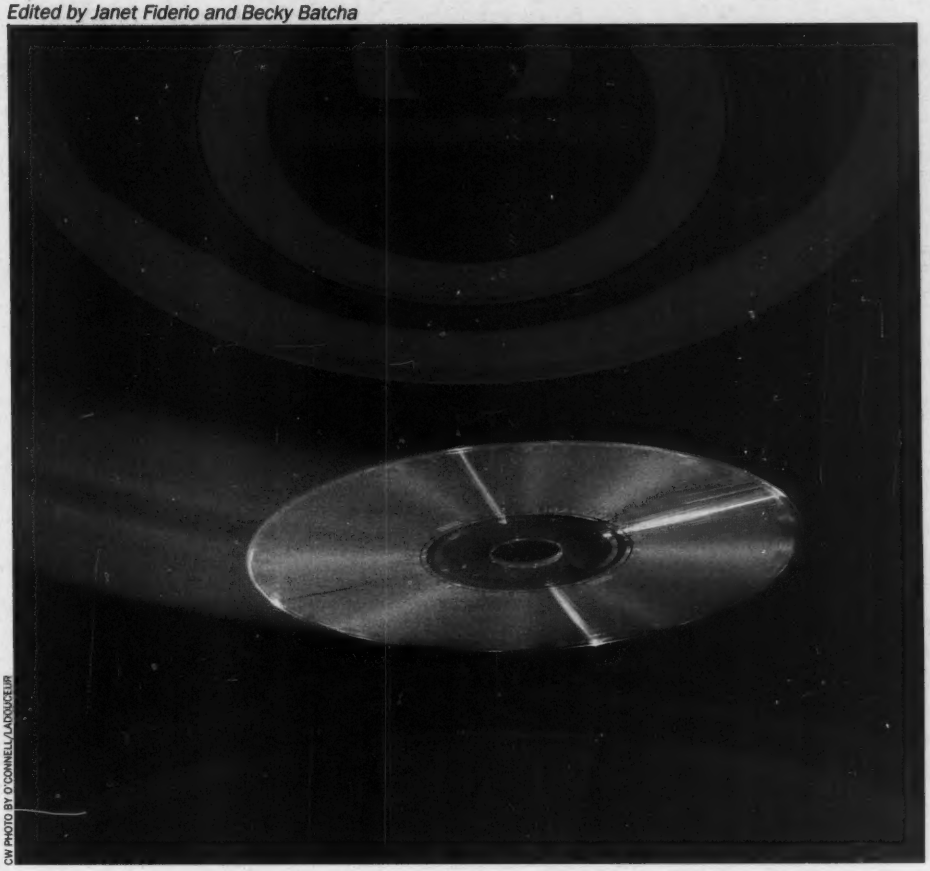
What seems to be clear is that vendors must recognize and must target high-priority and high-visibility services, even as less time-dependent professional and software services such as consulting and planning become more important to the user corporation.

Input's final conclusion seems to make sense: "Successful service vendors should target specific services most likely to improve the users' overall perception of hardware maintenance."

Five-year plans for system growth will never cure the stomachache the manager gets when a serviceman leans on a dead CPU and says the new part should be in the day after tomorrow.

Executive Report

Edited by Janet Fiderio and Becky Batcha



CW PHOTO BY O'CONNELL/LADOUCEUR

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Managing data storage

Ingenuity, current technology can cure I/O snags

By DONNA RAIMONDI

As computers become faster and more powerful, on-line usage grows at a rapid rate, doubling almost every two years. On-line applications require fast and frequent access to stored data, and, in a chain of linked events, stored data becomes one of the MIS manager's prime concerns.

The chain evolves like this: New on-line applications bring additional users on-board. The storage manager buys more storage devices to service these users. With the devices in place, the system slows to a crawl because too many users access too much data too frequently. Each moment that crawls past decreases the productivity of the users, who by now depend on the system.

At this point, the manager must find methods to manage data storage in order to alleviate access-time problems.

Solutions to the problems of data storage will not arise overnight. Although technologies such as optical disk or compact disk read-only memory (CD-ROM) catch the imagination of the public and press, they do not, because of their newness, offer an immediate answer to data storage problems. Managers who cope with I/O bottlenecks daily must look at currently available technologies such as cache buffers or solid-state devices and techniques such as shadowing to fulfill their data access needs.

According to Anthony Buccheri, director of computer performance and support for Automatic Data Processing, Inc.'s Brokerage Services Group in New York, data access time is important for one main reason. "If you can't get data quickly, you are going to be wasting the CPU," he says. "That is your most expensive resource, and you don't want to keep the CPU waiting."

The I/O bottlenecks that cause delays do not merely waste money; they can bring the system — and the company — to its knees.

In a perfect world, an integrated software package would free the storage manager from worrying about where and how his data was being stored or how quickly that data was being retrieved by users. The manager would merely specify how much space he needed, what frequency of backup he wanted and what type of performance his data required. The software would take over from there.

But in the real world, the manager is pretty much on his own. He must find a way to manage

Using storage devices effectively requires a delicate balancing act. Maintaining balance depends on knowing what data needs fast access and what data does not.

Raimondi is a Computerworld *senior writer.*

Storage management can cure I/O snags

Continued from previous page

internal and external storage in such a way that end users receive data without undue delay and without being aware of the system's machinations.

Managing real storage toward those ends is fairly easy. In the event of a memory shortage, the user buys a board or boards and plugs them in to his system. If his machine reaches its memory limit, he can buy a new CPU or upgrade to a higher model with increased capacity. Cost is usually the only constraint.

Dealing with the interaction between real storage and external DASD causes most of the storage manager's I/O headaches. In order to provide users with data from both real and virtual storage, a system must segment data into pages and swap these pages between the two sources.

Conventional electromechanical disk subsystems — even the top-of-the-line products such as IBM's 3380 and plug-compatible clones — cannot always provide fast enough access for paging and swapping transactions. Whenever the transactions fall behind, an I/O bottleneck occurs.

Attempts to access libraries, catalogs, data base indexes and similar collections of information also overpower conventional electromechanical subsystems and cause bottlenecks. Transactions that call for data from these sources account for another large share of the storage manager's woes.

A storage manager can eliminate I/O bottlenecks with one of two technological approaches:

• The first approach relies on solid-state storage subsystems and cache buffers to handle very high-performance applications. These devices are extremely capable, but they are also very expensive.

• The second approach seeks alternatives to the high expense of the first. It relies on scaled-down storage devices and human ingenuity to handle very high-performance applications.

Either approach begins with an evaluation of needs. Using storage devices effectively requires a delicate balancing act, according to Barbara Bowie, a senior consultant with Amdahl Corp.'s consulting services. Maintaining balance depends on knowing what data needs fast access and what data does not.

Some companies use blanket performance requirements for DASD, but Bowie advises managers that performance requirements are not a good idea. On-line applications require faster access than batch applications do — usually less than 30 msec for on-line vs. about 50 msec for batch. Performance data sets need even faster treatment — typically from 3 msec to 30 msec. The best situation is for managers to follow service-level objectives, she says, so they can meet the service requirements of their systems.

A COMPARISON OF COMMON MASS-STORAGE DEVICES

Storage System	Maximum Capacity	Speed of Data Access	Suitable Applications
Electromechanical disk drive	5G bytes	14 to 17 msec	Most on-line and batch applications
Cache buffer	128M bytes	Maximum channel speed	Paging and swapping
Solid-state device	768M bytes	0.3 to 1.6 msec	Paging and swapping; high-performance data sets

CW Chart

Electromechanical disk drives serve the bulk of large shops' storage needs, but they cannot provide fast enough data access for specialty applications. A manager can supplement his disk drives with cache buffers and solid-state devices to prevent bottlenecks, but he will pay handsomely for the privilege.

The first approach to data storage relies on cache buffers to improve system performance for heavily utilized data sets such as those on IBM's Data Facility Hierarchical Storage Manager; it calls for solid-state storage devices to page and swap data and to access frequently used libraries.

Cache buffers. These devices are small subsystems that act as a holding tank for data that the processor may need for its next transaction. Holding data in cache eliminates the slowdown caused by the system searching for the data in memory or storage. The buffers generally attach directly to the disk controller but can also reside in the CPU.

According to market research firm International Data Corp. (IDC), only between 10% and 15% of all large DP shops currently use cache buffers. The devices are gaining rapidly in popularity, though, because of the fast rate of DASD growth.

As more managers switch from single-density IBM 3380 drives to bigger but slower double-density models, cache use will increase, according to Dave Liddell, IBM's manager of storage systems marketing.

"I think that all of our large systems customers will use cache because it gives better performance to their system," Liddell says. About 70% to 80% of a large shop's data can go on 3380 Model E double-density drives without cache, he says, but data sets with very high access rates against them should be cached.

IDC analysts expect 25% to 30% of IBM's large users to support disk caching by 1987. The firm also predicts that when 50% of the large shops support caching, IBM will make it a standard feature on 3380 products.

Solid-state devices. These machines use high-speed semiconductor memory to guarantee fast access to virtual memory. Solid-state devices store data in semiconductor memory, eliminating the mechanical delays associated with conventional disk drives.

Systems like National Advanced Systems Corp.'s (NAS) 7900, Storage Technology Corp.'s (STC) 4305 and Memorex Corp.'s 6880 provide data transfer rates at speeds of about 3M byte/sec. per port, with some users claiming even faster rates. A quad-ported subsystem can provide a 12M byte/sec. data transfer rate.

With these rates, solid-state devices can provide data access at least eight times faster than the fastest electromechanical subsystems, giving access times of .3 msec to 1.6 msec, as opposed to an average of about 14 msec to 17 msec on an IBM 3380 drive.

Solid-state devices also cost more than their electromagnetic counterparts and provide much less capacity. NAS' 7900, for instance, costs about $498,000. This figure translates to roughly three times the price of a double-density IBM 3380, yet the 7900 stores only 512M bytes of data to the 3380's 5.04G bytes.

User organizations that can afford solid-state devices employ them primarily for paging, swapping and accessing high-activity application data. The devices do not suit all types of data storage because if the system crashes or its power goes off, all is lost. Vendors offer optional battery backups as a remedy.

IBM 3090 mainframe shops do not need solid-state devices because Big Blue included in that system an internal solid-state device called Expanded Storage, which meets paging and swapping needs. IBM does not offer any other solid-state devices at this time, but analysts predict the firm will do so sometime in the near future.

The solid-state/buffer cache approach to data storage is in its infancy at the U.S. Postal Service Data Center in San Mateo, Calif. According to John Ku, the data center's branch manager of software systems, the shop turned to this approach after frequent activity on some data sets — on-line and TSO applications and link libraries — caused bottlenecks to occur.

In support of two Amdahl 5870 mainframes running under MVS (soon to be under MVS/XA), the center operates 464 electromechanical storage devices — a combination of IBM 3350- and 3380-type disk drives — which it supplements with three strings of STC 4305 solid-state devices. The center has ordered two 8M-byte cache buffers but has not yet installed them.

The solid-state devices run paged data only, according to Bill Keathley, the center's program manager for software administration. When the cache buffers are installed, the center will use them for its frequently used data sets. Keathley and Ku considered putting the

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Tools assist managers with DASD control

No software solution can do a storage manager's job for him, but several tools can help the manager figure out and control his DASD requirements.

Commercial software tools and packages automatically back up and load data, compact it, get rid of information over a certain age and convert data from one device type to another.

IBM, the leading storage vendor for large-scale systems, offers Data Facility (DF) products, a line that includes the DF Hierarchical Storage Manager, DF Product and DF Data Set Services.

• DF Hierarchical Storage Manager is an MVS tool that allows for the backup of individual data sets as they change. If a problem arises with an I/O device, the software figures out which data sets need recovery and recovers only those.

• DF Product provides storage devices with support in error recovery, data management and access methods.

• DF Data Set Services is primarily a dump restore, but it can also allow dumping from one type of disk to another, reformatting data as necessary. This tool is said to be especially helpful to managers who are switching to new devices, say from an IBM 3350 environment to an IBM 3380 Model E.

IBM's MVS operating system also supports a tool called the Resource Management Facility that can determine when a CPU needs more real memory and can tell which of a system's data sets are good candidates for caching.

When operations managers discuss storage management software, they frequently mention two tools from vendors other than IBM: Cambridge Systems Group, Inc.'s Automated Space Management 2 (ASM2) and Sterling Software, Inc.'s Disk Management System/OS (DMS/OS).

ASM2, which runs on large-scale IBM and compatible equipment, resembles IBM's DF Hierarchical Storage Manager. Janet Sanchez, manager of operating systems for American Express Co.'s Card Division, says that until recently, ASM2 offered more functionality than the IBM product. But IBM made some enhancements to its tool, and the two are now about equal, according to Sanchez.

DMS/OS runs on all IBM and compatible computers operating under OS. The software performs reporting on the locations and use of data, provides automatic backup and archival tasks, features idle space release for space that is allocated but not used and organizes partition data sets.

Optional facilities include direct disk-to-disk migration, interfaces to popular security packages and DASD billing for chargeback to users.

— Donna Raimondi

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data sets on the solid-state devices but decided against it because if a solid-state device were to lose power, everything on its drums would be lost.

The price per megabyte of storage rises considerably when a manager decides to use caching devices in addition to electromechanical disk subsystems. It goes up considerably again when he decides to put some of his organization's data in solid-state devices.

For example, according to IDC's David Vellante, the average price per megabyte for IBM's 3380 single-density electromechanical disk subsystem is $35. The cost of the 3380 double-density subsystem is $24 per megabyte. An average cost for a controller cache buffer, on the other hand, is $6,000 per megabyte, while the average cost for IBM's extended storage is $7,421 per megabyte.

To avoid these cost increases, managers rely on the second approach to data management, which embodies a variety of tactics.

Some managers eliminate bottlenecks and speed up access times by removing subsets of their data from a high-volume, low-performance disk storage device and migrating those subsets to a low-volume disk storage device that provides higher performance. Amdahl's Bowie suggests this approach.

If performance is still not acceptable, the manager can add a cache buffer to the setup, Bowie says. If the organization needs more rapid access, the manager might then move critical data sets to a solid-state device.

Other managers use their own methods to eliminate bottlenecks without investing in solid-state devices and cache buffers. Automatic Data Processing's Buccheri is one of those managers. He says the firm's Brokerage Services Group needs faster access to high-performance data sets than its electromechanical storage devices can provide.

The group relies on 493 electromechanical disk drives — IBM 3350- and 3380-type devices — to store data for its CPUs. Brokerage Services runs an IBM 3084, an Amdahl 5860, two Amdahl 470V/8s, more than 20 Digital Equipment Corp. PDP-11s and a few DEC VAX machines as well as microcomputers from Convergent Technologies, Inc. and IBM.

The ever increasing speed of the company's CPUs, coupled with the static speed of its I/O subsystems, sometimes leads to I/O bottlenecks. When this happens, Buccheri relieves the load on his shop's storage devices by spreading problematic files over multiple devices. "We just take the same file and shadow it onto two different disks," he says.

This shadowing method costs about $550 per month, Buccheri says, as opposed to the $11,000 per month it would cost to buy and service a solid-state device. Automatic Data Processing would have to realize a sixfold increase in its client base before it could justify such a purchase.

Vendors outside the IBM fold also suggest an alternative approach to avoiding bottlenecks. Whereas IBM backs a trend toward bigger and denser disk systems for external storage, these vendors back an opposite trend.

Tandem Computers, Inc., which makes disk systems for its own online transaction processing computers only, has decided that less is really more. Tandem makes a disk storage facility, the XL8, that employs up to eight high-density disks — each with its own access arm — for a total capacity of 4.2M bytes.

With the Tandem XL8, a manager can request that a file be written over all eight disks and accessed by the eight arms concurrently. Because the disks are fairly small — 9 inches instead of the usual 14 — the arms provide quick access, an average time of 15 msec. Control Data Corp. and the Japanese firms Hitachi Ltd. and NEC Corp. also ship 9-in. disks.

Users in the superminicomputer and scientific workstation markets have been quick to realize the benefits of these smaller disks. Large system shops may find similar value, according to Rooshabh Varaiya, Tandem's director of engineering. Storage managers can rack-mount two 9-in. disks side by side in place of one 14-in. drive.

Small disks spin faster than large ones, are more reliable, consume less energy and generate fewer environmental costs, according to Fred Moore, director of STC's worldwide product marketing. "A lot of the

Continued on page 38

Optical storage emerges as serious option for specialty jobs

By EDWARD S. ROTHCHILD

Before they embrace optical storage, many organizations will hold out for the somewhat distant coming of erasable technology. But trailblazers can move ahead right now with write-once optical storage, a technology that surpasses magnetic storage in capacity and cost-effectiveness for many applications.

Eventually, most MIS managers will consider bringing some type of optical storage into their shops because the technology holds great appeal.

Optical storage devices and media approach the random-access capability of magnetic disks and surpass the tremendous storage capacity of magnetic tape. They cost less than magnetic storage products and take up a lot less space in the shop. Moreover, all optical media are completely removable, eliminating the need for backup.

Right now, optical storage technology is challenging magnetic storage technology in the microcomputer arena and beginning to attract minicomputer users. Before the keepers of mainframe data storage get involved, however, optical storage technology needs to advance in two ways.

First and foremost, optical storage vendors must offer faster random-access rates. Currently, optical drives beat magnetic tape drives but cannot keep up with magnetic disk drives. Within two years, access speed will increase, and mainframe shops will begin to take notice. Second, erasable technology, which remains out of reach, must come into its own.

Waiting for erasable disk drives is a safe move for users because such devices closely resemble their magnetic counterparts. Erasable optical drives support reversible media on which users can erase and rewrite data, just as they do on familiar magnetic disks and tape. But commercially viable products will not make their mark until 1988 or later.

Write-once optical drives and media do not allow users to erase and rewrite data; once a user stores data on an optical disk, he cannot change or update the disk's contents.

But write-once products are available right now, and their huge storage capacity makes them attractive to current users of erasable magnetic media — especially users who never erase or write over their magnetic media anyway.

One 12-in. write-once disk can hold 3.6G bytes of data, the equivalent capacity of about 20 reels of 6.25K bit/in., 9-track magnetic tape. In comparison, IBM's largest disk storage device, the 3380 E, holds a total of 5G bytes on 18 magnetic disks.

Users who explore write-once optical technology travel in relatively uncharted territory. Although Japanese users have installed about 6,000 write-once optical disk drives, fewer than 100 such devices have made their way to end-user sites in the U.S.

The advantages of optical storage balance out the risks of experimentation, however, in applications that call for more storage capacity than magnetic media can provide. Any application that calls for scanned image data is a good candidate.

Write-once optical storage offers an additional advantage over erasable magnetic storage for applications in which an organization cannot risk erasing any version of a record for legal or archival reasons or for maintaining an audit trail.

Applications that meet the two criteria — permanence and massive storage needs — include the collection of seismic data as well as the storage of engineering drawings, X-rays and office documents.

The greatest number of business applications falls within the category of document storage. Businesses can use optical devices and media to store insurance claims, bank loan applications, legal contracts, leases, personnel records and similar documents.

Write-once optical storage offers advantages over film storage as well. An organization can buy an entire write-once optical disk document filing system for the same price — between $30,000 and $40,000 — as a device that merely prints hard-copy replicas of documents stored on microfilm.

Optical filing systems typically include a write-once optical disk drive, a floppy disk drive, a Winchester disk drive, a microcomputer, a document scanner and printer and some application software that allows everything to work together.

To date, only 1% of all businesses run automated document filing systems. The remaining 99% support no application large enough to justify the great cost of microfilm systems. Now that write-once optical storage is available, however, those percentages seem likely to change.

Although the market for optical storage products is very young, it already supports an impressive array of products. Systems integrators offer subsystems that attach to mainframes from IBM, Hitachi Ltd. and Fujitsu Systems of America and to superminis from Digital Equipment Corp. and other vendors.

At U.S. government installations, technicians have interfaced optical disk drives to Cray Research, Inc. supercomputers as well.

At the Comdex/Fall '85 show in Las Vegas in November, 50 firms showed optical disk products. Many innovative write-once systems were among the lot, including a backup storage system for Winchester disk users that was portable enough to serve a number of personal computers. ■

Storage consultant Rothchild

Optical storage is now challenging magnetic storage in the micro arena, but the technology needs to advance before mainframe shops take note.

Rothchild is chairman of Rothchild Consultants, a San Francisco consulting and market research firm that deals exclusively with optical memory technology.

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energy in a disk drive is just spinning those platters around and around," he says. "The smaller the platter, the more reliability you have because you don't have the wobble and the lack of stiffness that you have out on the outer edges of larger platters."

Mike Stanek, manager of storage product programs at Amdahl, agrees. "The 14-in. platter that we have grown to know and love," Stanek says, will be sized down to 9 or 10 inches sometime in the future.

□ □

Managers cope with variety of concerns

Of course, the storage manager deals with a myriad of issues other than access speed. He seeks reliability in storage equipment — the failure of which can cause the whole system to crash. He locates the physical space in which to put storage units. He manages archival resources, and he keeps track of new technology lest his organization miss out on something that could improve services.

Reliability. Unquestionably, reliability is the No. 1 quality that data managers seek in their direct-access storage devices. The managers need to make sure no hardware or software failures will interrupt system usage.

R. Edwin Earle, vice-president of DP operations for American Express Co.'s Card Division, finds reliability especially important. His division processes all payments and inquiries from the company's 10 million to 12 million cardholders and cannot

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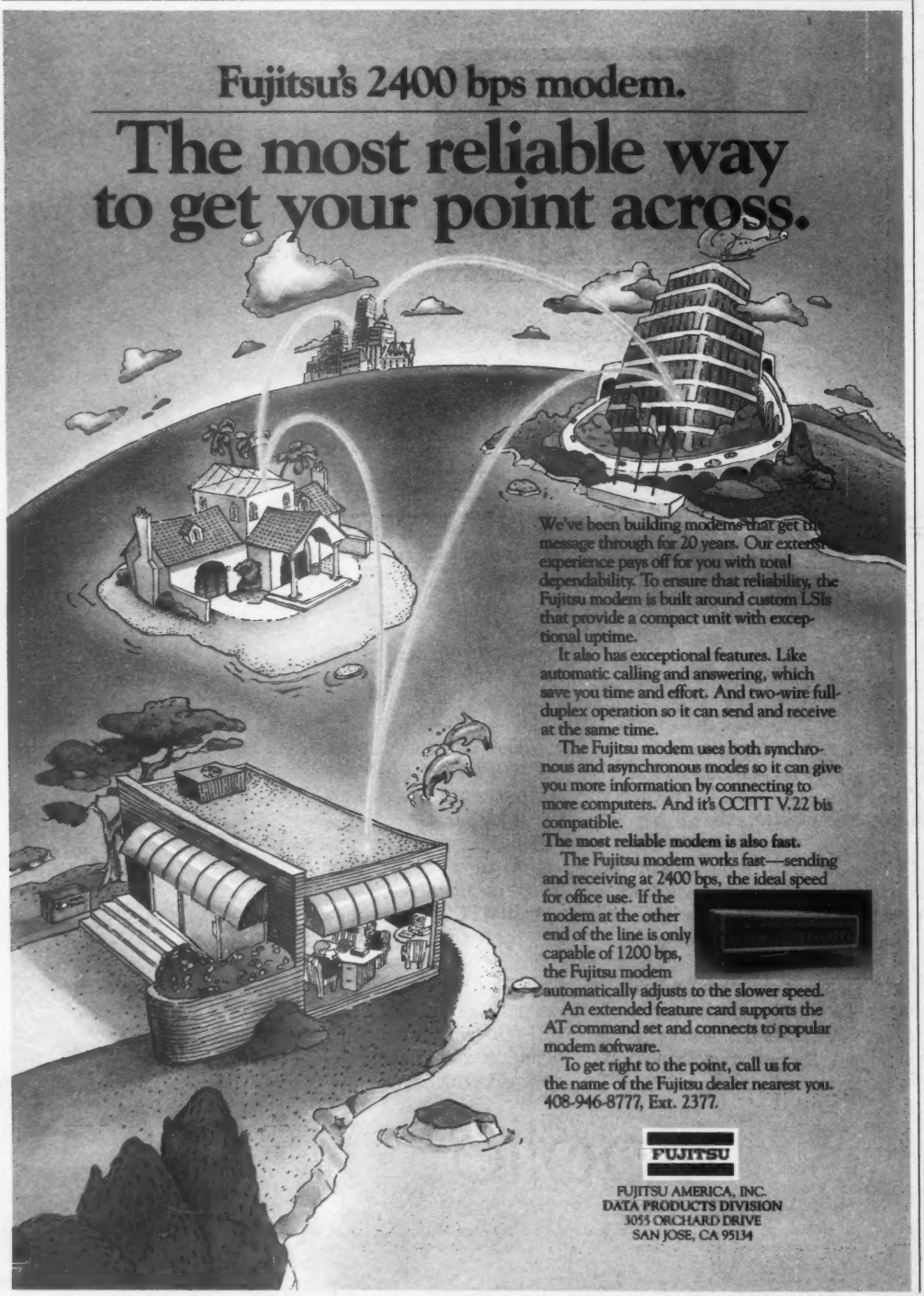

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Survey

Reliability outranks all else

Given a magic wand, what would storage managers create to relieve their problems?

Computerworld *senior writer Donna Raimondi set out to find the answer recently in a series of interviews with storage managers. With few exceptions, the managers said they would conjure up reliable, predictable systems.*

Some typical responses follow:

• "Get 100% reliability with a minimal performance/cost impact," said R. Edwin Earle, vice-president of DP operations for American Express Co. "That would be my wish."

❞

'I would create a new storage device without losing reliability. It would have very fast access, fit in a very limited space and have low power consumption.'

— John Ku
U.S. Postal Service
Data Center

• "What I'd like is the ability of the mainframe to be smart enough to do some kind of component fault isolation," said Anthony Buccheri, director of computer performance and support in Automatic Data Processing, Inc.'s Brokerage Service Division. "It's hard for us to explain to our very large users how a single device can cause the system to get hung."

• "No failures," said Bob Oshinsky, operations manager for Accredited Computer Services. "It seems that each time we come in with a new DASD device, we have a burn-in period. It's a nightmare."

• "I would create a new storage device without losing reliability," said John Ku, branch manager of software systems for the U.S. Postal Service Data Center in San Mateo, Calif. "It would have very fast access, fit in a very limited space and have low power consumption."

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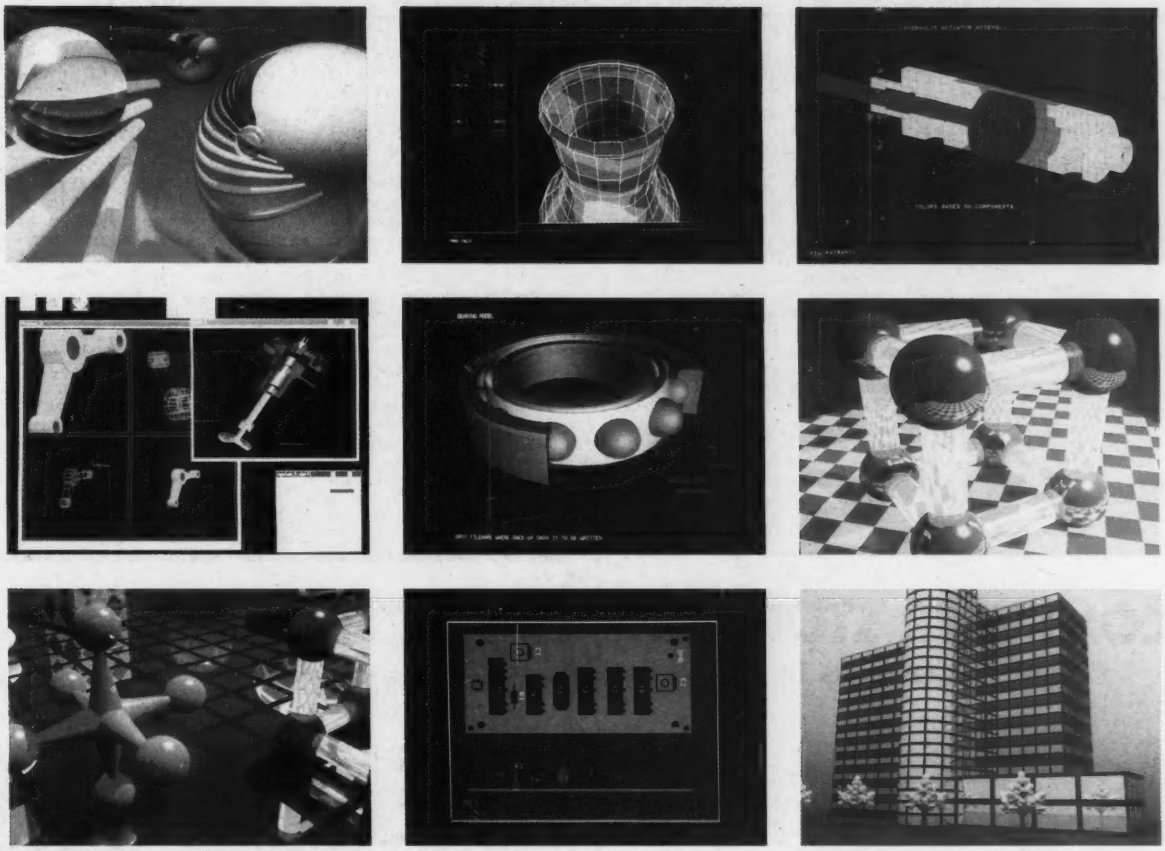

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CD-ROM's high capacity, low cost tempt business users

By ANNE A. ARMSTRONG

As soon as the compact audio disk created a sensation in the recording industry, computer industry observers began betting on a similar outlook for the audio disk's data cousin, compact disk read-only memory. This technology, commonly known as CD-ROM, holds the potential to provide inexpensive storage and distribution for massive quantities of information.

CD-ROM drives were announced in November 1984 at the Comdex show. To date, nine companies offer drives. Hitachi Ltd., Philips Subsystems and Peripherals, Inc. and Sony Corp. are shipping in quantity. Digital Equipment Corp., Reference Technology, Inc. and Tecmar, Inc. are marketing value-added versions of OEM drives. All of the drives connect to the IBM Personal Computer or compatibles, except for DEC's, which has an interface to the Microvax II and one for micros.

Armstrong is managing editor of "CD Data Report," a monthly compact disk industry newsletter published by Langley Publications, Inc. of McLean, Va.

Drive prices have been hovering between $1,000 and $1,500 but are expected to fall dramatically to $500 or less as production picks up.

Users should find CD-ROM particularly appealing for four reasons:

- It relies on established, tested technology — the same technology that Sony and N.V. Philips announced in 1980 for audio uses.
- Compact data disks meet a set physical standard. All disks are 4.72 inches in diameter.
- The storage capacity of a single compact disk — 550M bytes — equals the capacity of 1,500 floppy disks.
- Hardware costs are moderate. Compact disk drives currently sell for between $1,000 and $1,500, and the typical price should drop to approximately $500 late this year or in the first quarter of 1987 when mass production takes hold.

As a read-only disk, the data is first prepared on a master, which then creates the individual disks in a stamping process somewhat like phonograph record production. But, contrary to what is sometimes suggested, CD-ROM is not likely to be an interim product, successful only until erasable drives appear.

Two companies — NEC Corp. and Matsushita Electric Industrial Co. — are quietly showing combination erasable optical drives that feature a read/write/rewrite drive that can also read CD-ROM disks.

Most of the early CD-ROM-based products on the market were geared to the library market — either as professional cataloging tools or as reference works for a library setting. Now, however, CD-ROM is used for storing financial information, for indexes to vendors' product catalogs, for emergency toxic substance information, legal and tax information and as a newspaper morgue.

The first product aimed at the consumer market is the Electronic Encyclopedia, priced at $199, which Grolier Electronic Publishing, Inc. has put on CD-ROM and will sell in retail stores. Another consumer disk is the entire PC SIG public domain software library. Library Corp. was expected to start selling the disk, which contains more than 9,000 software packages on a disk, late last month. Reference Technology offered a similar package with its CD-ROM drive.

CD-ROM can be attractive in a corporate setting for replacing parts catalogs, regulations, forms or any reasonably stable data base. It can be more cost-effective than accessing data stored on-line at a remote site because there are no telecommunications charges and no charges by the minute for use. Although there is an initial equipment charge and a data preparation charge, executives can keep a fairly firm control over the budget because fees are not based on usage time.

In areas where telecommunications are unreliable, such as remote sites or underdeveloped countries, distributed data on CD-ROM may be the only reliable way to guarantee access to information.

CD-ROM can also be used to distribute software — in a form that cannot be easily pirated. Microsoft Corp. is interested in the possibilities of using CD-ROM for that purpose. It recently bought a small firm that specializes in vertical market applications on CD-ROM and has created a new CD-ROM division. In addition, the company is sponsoring a high-visibility conference on CD-ROM applications in March, at which time the company may demonstrate a CD-ROM product.

CD-ROM should move into wider use by the end of this year as many of the products now in development actually get into the marketplace. Data format standards questions should be settled by mid-year at the latest. ■

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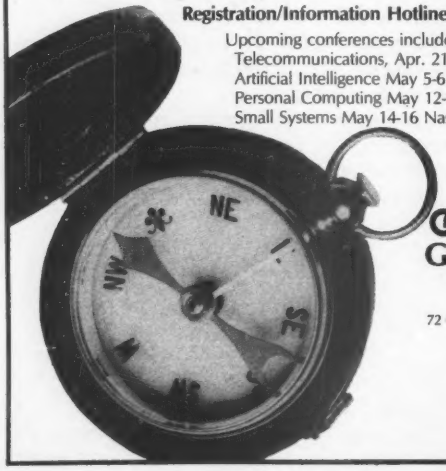

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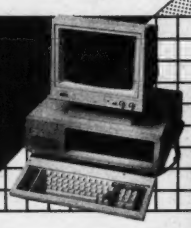

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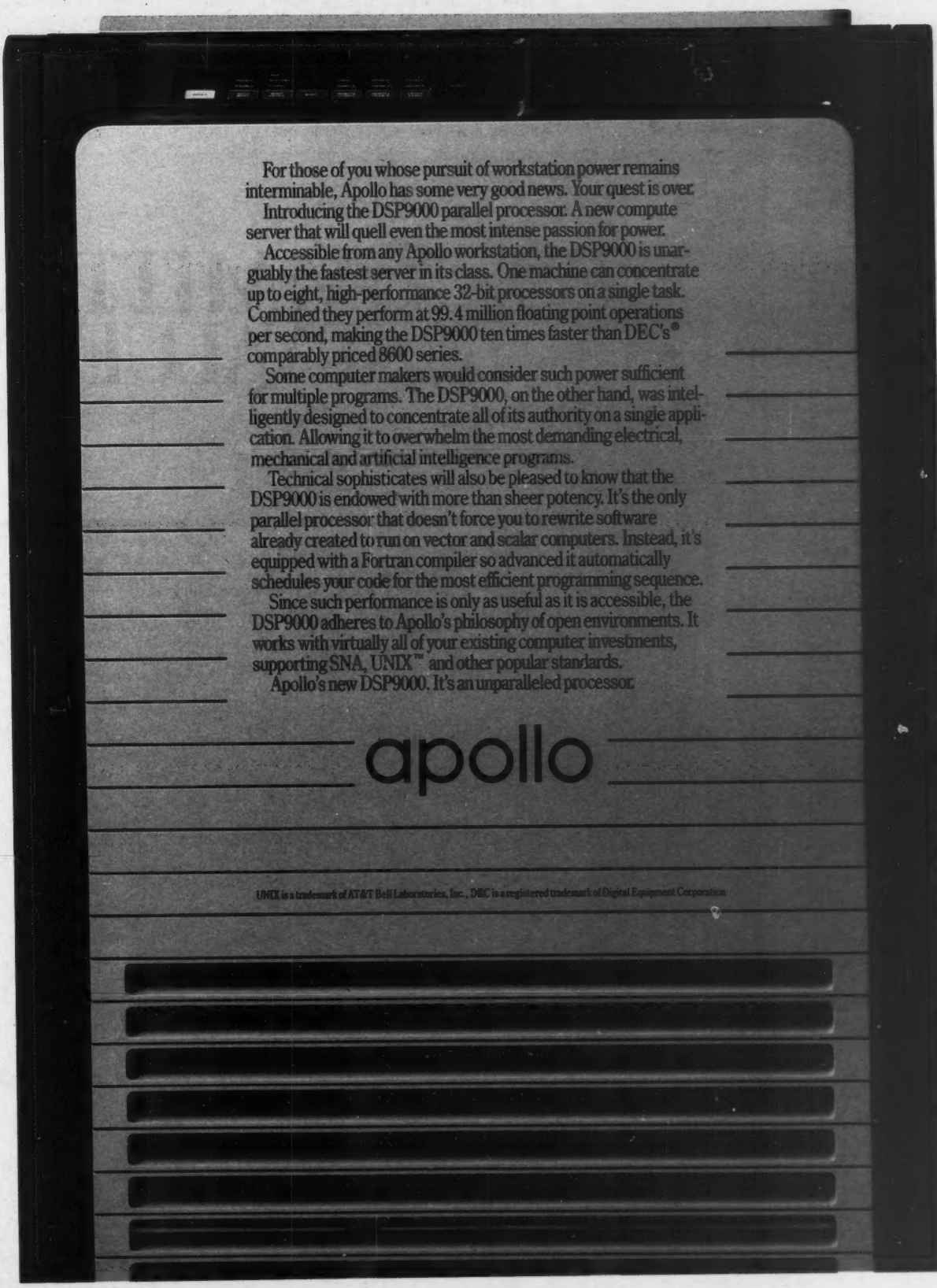

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Continued from page 38

afford downtime. "Any interruption in on-line environment and we are putting literally thousands of people out of work," Earle says. He has two requirements for a storage system. "We want it reliable, and we want early warnings."

Although vendors stress they are closer than ever to providing reliability, not one has devised a fail-safe system.

Automatic Data Processing's Buccheri explains, for example, that in certain kinds of hardware failures, the IBM 3480 tape device cannot properly apprise MVS of its condition. Meanwhile, MVS waits for the device, keeping the whole system in suspense.

What Buccheri wants to see — a wish echoed by many operations managers — is an ability for the operating system to keep on going and not get hung up by that one device.

Physical space. Physical space in which to keep external storage is a serious problem for many storage managers. The U.S. Postal Service's San Mateo, Calif., data center, for example, had to buy a new facility and move its DP operations a year ago, largely because it ran out of places to put DASD, according to the center's branch manager of software systems, Ku. The new facility will be good for five to seven years of normal growth, he says.

Other managers, though, seem already to have assimilated new, compact devices to the point where they seldom see size as an issue.

"So far, the technology has been changing enough to allow us to move old technology out and new technology in at a pretty reasonable rate," says Buccheri.

New products, such as the dual-density lines that IBM and the plug-compatible manufacturers are bringing out, give plenty of capacity in relation to physical size, he says.

Although IBM by far garners the biggest share of the large-scale disk device market, some users are opting to buy plug-compatible versions because they make better use of space.

Buccheri, for instance, says he started buying Amdahl disk drives because they make use of upper air space. He also is converting from 3350- to 3380-type devices because he can theoretically double the amount of data stored in the same physical footprint. In reality, though, his performance figures show a 1.5:1 ratio.

Archival storage. Data's final resting place, the archival storage subsystem, is the least of the storage manager's troubles. For both

Continued on page 50

IBM drives trends in mainframe storage mart

By DAVID VELLANTE

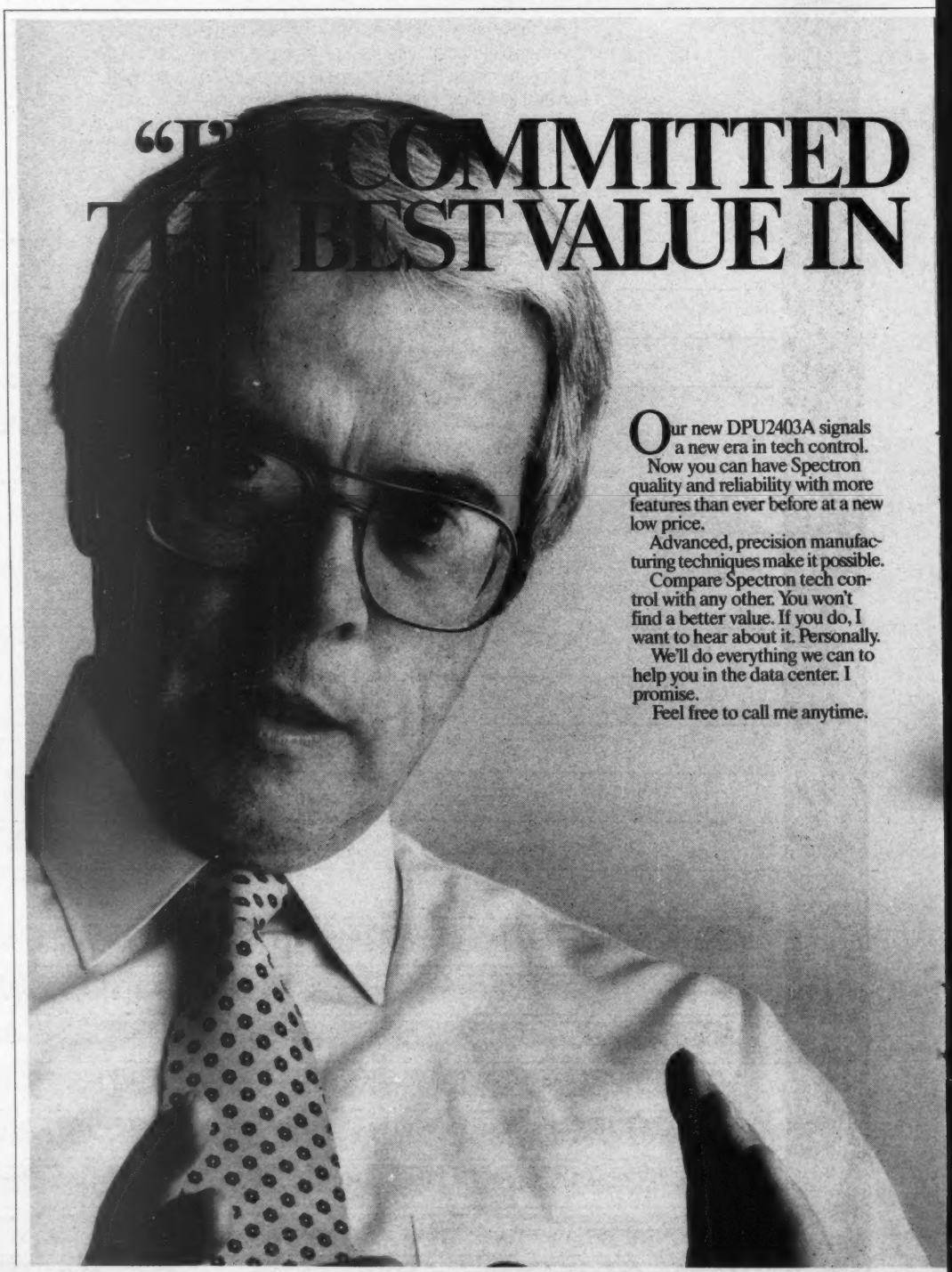
In the near future, mainframe data storage managers can expect to continue to be influenced by IBM's product introductions, namely the 3380 dual-density disk drives and the 3480 cartridge tape drives. But as 1990 approaches, managers may have the option of using "quad-density" devices or thin-film technology.

IBM's dramatic announcements and enhancements of large-scale storage devices during the past 15 months will continue to have an impact on the data storage arena throughout the 1980s.

Evidence of IBM's confidence in its ability to exert control over the mainframe disk market came in the form of a February 1985 announcement of a double-density 3380. IBM provided no upgrade path to dual-density for the whopping 200,000 spindle installed base of original 3380s that had accumulated since 1981.

Instead, the company introduced a new single-density 3380 that is upgradable to the double-density version. The new drives cannot reside on the same controller string as the older 3380 devices.

From a revenue standpoint, it is in IBM's best interest to migrate users to the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double-density 3380. It is also, however, in the company's interest to make the transition to dual density as smooth as possible.

The reasoning behind IBM's introduction of a single-density upgradable device, in conjunction with the dual-density 3380, is that the firm recognized the continued short-term market demand for a single-density 3380-class drive.

Typically, with an increase in capacity, users experience a decrease in performance. The dual-density 3380 is no different — the more data under the same number of heads, the greater the impact on drive performance.

When making a purchase of 3380 storage devices, users have three basic options with respect to performance problems. One is to purchase a double-density 3380, utilize its full capacity and install extremely fast cache memory chips that reside on the 3380 controller.

Another option is to purchase a double-density 3380 and only use a portion of the drive's capacity, maybe one half, hence achieving similar performance to single-density devices.

A third choice is to purchase a single-density drive. Because each option has strengths as well as drawbacks, many users are faced with a trial and error situation.

It is estimated that only about 12% of mainframe users currently employ cache memory. Perhaps when 50% of the mainframe user base has cache, IBM will make it a standard feature on the 3880 controller. This will likely occur late in 1988 when IBM is expected to introduce its next-generation quad-density device.

IBM's recent price cuts in the area of double density as well as drive and cache upgrade price cuts clearly indicate its desire to move users to double density. The price of the single-density drives stayed the same as an incentive to get users committed to dual density.

Although IBM's strategy presents an opportunity for plug-compatible manufacturers to ship single-density products at prices below those offered by IBM, the company is still likely to succeed in eventually moving its user base to dual-density devices.

As 1990 grows closer, the inevitable announcement of a quad-density device raises future considerations. To use such a device effectively, cache memory and storage management software must be firmly in place.

Furthermore, IBM's experience with thin-film technology may become a data storage issue. This technology will be critical to the advancement of the 3380 family beyond double density.

> ***IBM's recent price cuts in the area of double density clearly indicate its desire to move users into that arena.***

The Japanese-supplied drives available from National Advanced Systems Corp. and Amdahl Corp. have, to date, relied on extremely slick and efficient packaging schemes using multiple spindles and conventional ferrite-head technology. At some point they will be forced to make decisions regarding thin-film head implementation.

Other products in the area of mainframe storage that will shape the management of data as we approach 1990 is the 3480 cartridge tape drive and the advent of very fast solid-state storage devices as a means of paging, swapping and logging high-transaction data.

Ultimately the effective use of combinations of disk, tape and solid-state storage depends on the user's application. Managers must give careful consideration to the cost and performance issues associated with emerging storage technologies before they buy. ■

Vellante is a program manager in the storage products market program for International Data Corp., a market research firm based in Framingham, Mass.

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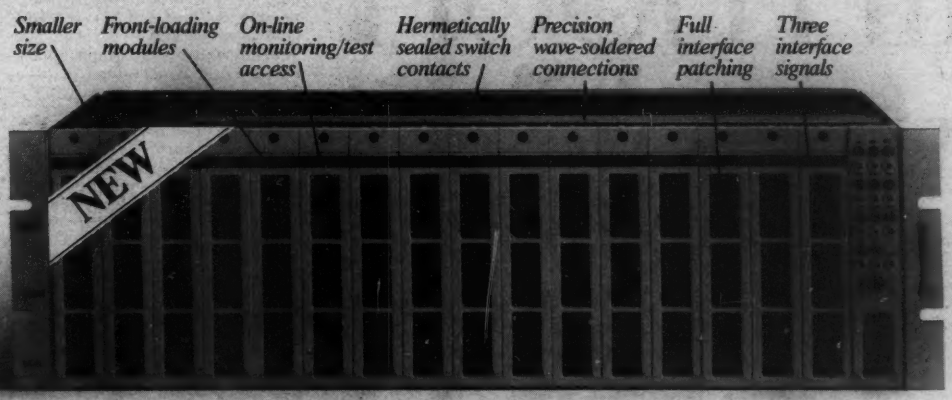

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Small drives, intelligent controllers set mini storage trends

As 1990 approaches, managers can expect a number of price/performance advances in minicomputer-based data storage devices. Among the trends managers will see is a shift to smaller form-factor drives, higher capacity 5¼-in. Winchester disk drives, complex multiple-spindle disk subsystems and intelligent data access controllers.

The acceptance of the minicomputer as a departmental system spurred the use of multiple-spindle 10½-in., 9-in. and 8-in. drives, which provided users with alternatives to 14-in. Winchester drives.

Prior to 1984, 8- and 9-in. rigid disk drives were not commonly used in the mid-range to high-end minicomputer market. That changed during the past two years, however, when system vendors and OEMs alike found that demonstrably better price/performance ratios resulted from the use of smaller drives. These smaller drives will continue to gain in popularity for several reasons:

- The form-factor allows two smaller drives to be rack mounted side by side, which can double the overall capacity of the rack.
- Smaller drives are more flexible in terms of capacity and removability. Depending on the application, users can rack mount different capacity drives in 8-, 9-, 10½- and 14-in. models.
- Smaller drives support the storage module drive (SMD) interface, which has become a standard with minicomputer disk OEMs. The drives also support intelligent interfaces, which will begin to be employed extensively into 1990. With these interfaces system vendors can relegate storage housekeeping tasks to the disk controller.
- These drives offer some of the most impressive performance/reliability specifications in the industry.

They are also more flexible when it comes to configuring storage devices for minicomputers. For example, Control Data Corp. plans to introduce a 9-in. 300M-byte scaled-down version of its current 340M-byte drive, which will be directly plug-compatible with CDC's older 9766 removable drive. The 9-in. drive will be smaller and more reliable, consume less power and cost significantly less than the 9766.

Other 9-in. disk vendors have been successful marketing their product as a direct supplement to the 10½-in. Fujitsu Ltd. Eagle. In situations where size is critical and the capacities of 8-in. drives do not meet vendor or user requirements, the 9-in. drive is a viable alternative. Tandem Computers, Inc. for example, recently introduced a 4.2G-byte subsystem based on 9-in. technology.

Fujitsu's 474M-byte Eagle I, introduced in 1982, has become one of the most popular devices in the industry. Keeping pace with the demand for higher capacities, Fujitsu unveiled the second-generation Eagle II in 1984. The drive offers a 689M-byte capacity and a high-speed SMD transfer rate of 2.4M byte/sec. Because the older Eagle is feeling pressure from 9-in. drives from its competition, Fujitsu must place more emphasis on the newer Eagle II model in 1986.

Fujitsu's direct response to the popularity of smaller form-factor drives is a small computer systems interface (SCSI) node allowing four 337M-byte 8-in. drives to be connected. This configuration will become popular as other vendors plan similar deployments involving SCSI. The SCSI interface also has implications for the 5¼-in. Winchester disk drive. The capacities of this device will go beyond 300M bytes by 1990.

Because of increases in power and the ability to cluster processors, the high-performance minicomputer mart has growing requirements for multiple-spindle disk subsystems.

Another trend that will appear as 1990 approaches will be the emergence of intelligent controllers that can manage intricate disk and tape combinations efficiently.

Intelligent controllers will allow multiple disk and tape devices to be attached and concurrently accessed by a number of clustered CPUs. Currently, state-of-the-art controllers allow 20 to 25 devices to be accessed by as many as 15 processors. As the number of spindles in the configuration increases, the need for intelligence becomes more evident. Intelligent devices have features such as the following:

- Dual porting — allows transfers of data to be done simultaneously with handling seek requests.
- Backup utilities — such as disk-to-disk or disk-to-tape are managed by the intelligent controller.
- Positional tracking — the controller keeps track of spindle rotational positions allowing seek requests to be fragmented and handled based upon the position of the read/write head.
- Cache buffers — as with mainframe controller cache, the more reads that can be handled through cache memory, the less mechanical movement is required.

All of these features are controlled by a microprocessor, and all are transparent to the host system.

— David Vellante

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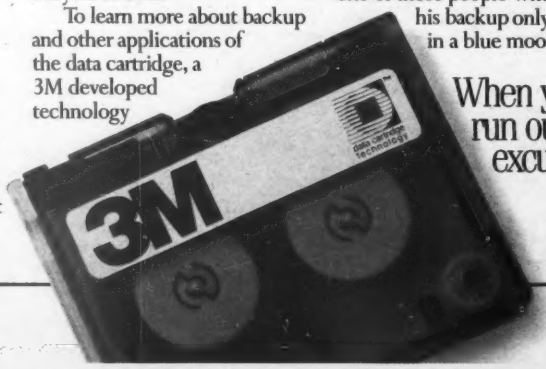

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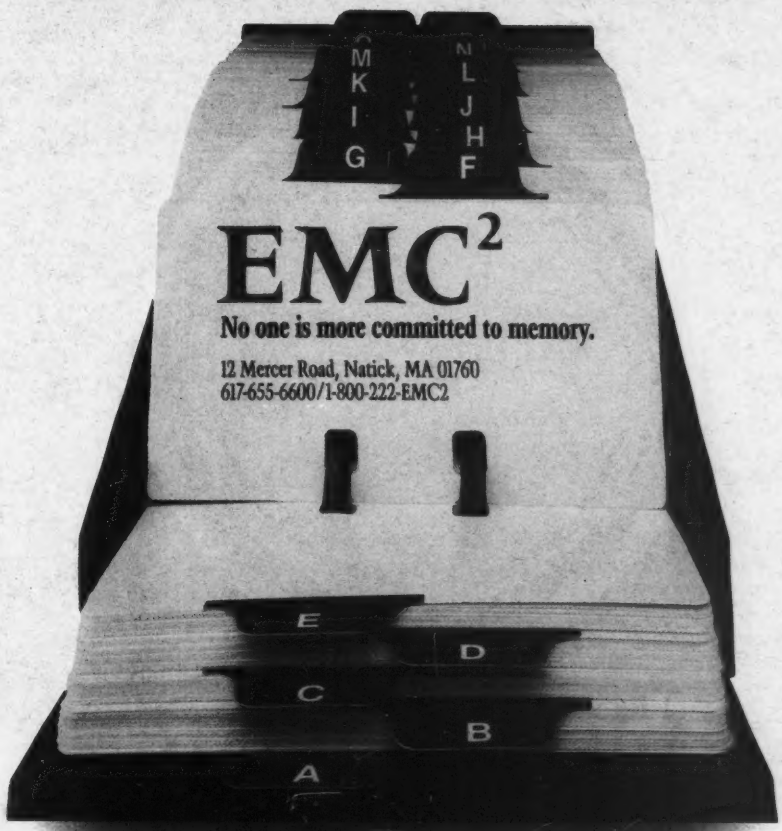

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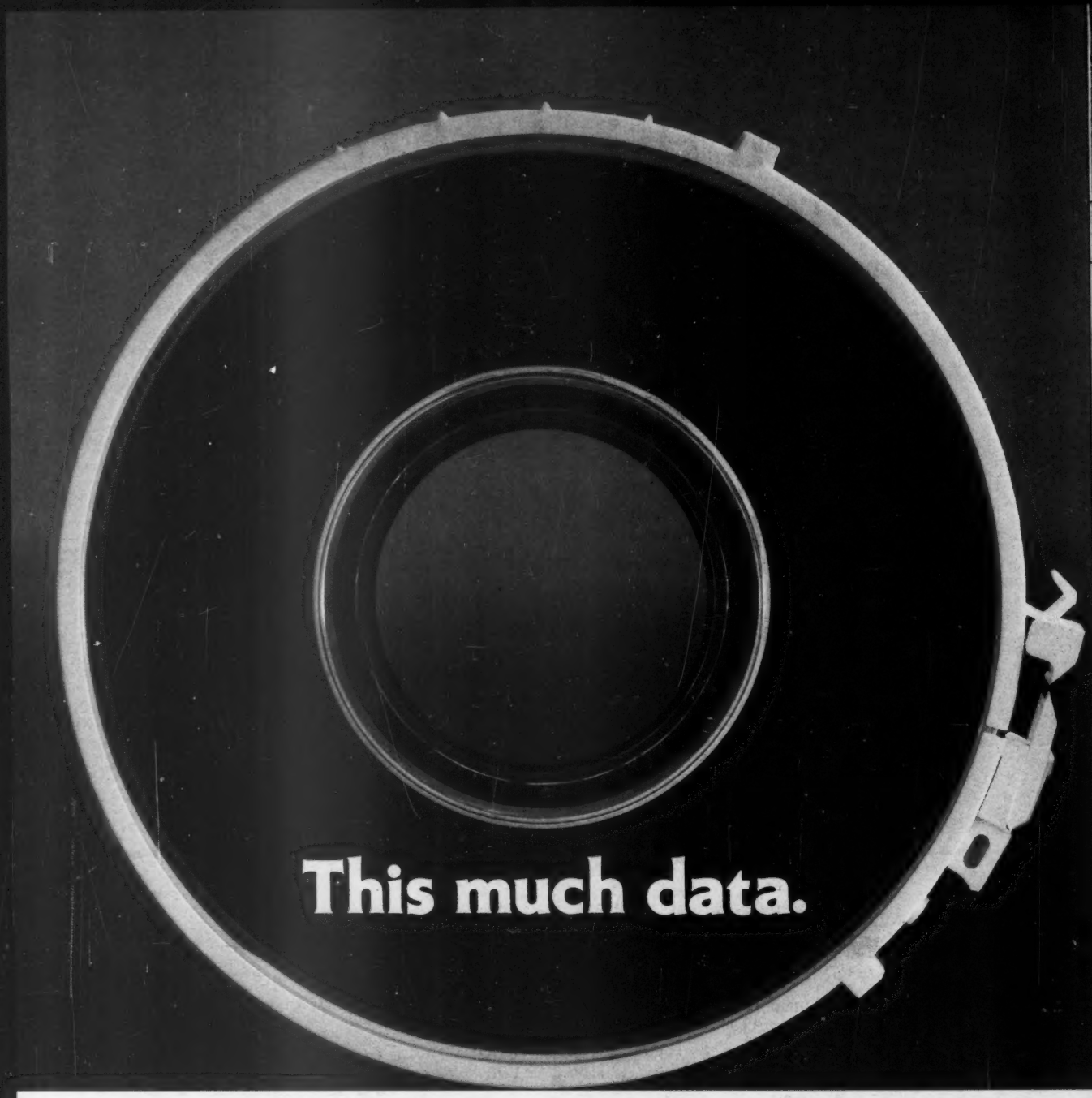

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Optical disk drives, improved capacity lead micro trends

By EGIL JULIUSSEN

Two far-reaching trends will determine the course of personal computer mass storage over the next decade. First, optical disk drives will emerge as the storage devices of choice. Second, other devices will increase their capacities and performance in an effort to compete.

Optical disks take hold. Personal computer users require both on-line data storage and off-line data storage; they also need a medium for storing and loading programs. Right now, no mass storage technology can satisfy all three needs.

Optical disk drives hold the potential to meet each requirement, however, and to provide the three functions at a price that the business user can afford. If they fulfill their promise — a safe bet — optical disk drives will begin outselling magnetic storage devices by the mid-1990s.

Before optical technology can enter the mainstream, though, manufacturers need to offer erasable capabilities and to bring the price of erasable optical disk drives down to match that of Winchester disk drives.

Currently, optical drives support just read-only and write-once capabilities. Both impose limits on users. Read-only optical disks come with prerecorded information that users cannot change. Write-once disks start out blank, but once a user records information, he cannot modify or erase it.

Manufacturers will start marketing erasable optical disk drives in about two years. Initially, they will cost a lot, but by the early 1990s, their prices will be no higher than those of Winchester disk drives.

Capacity and performance increase across the board. Manufacturers of the current leading storage devices — floppy disk drives, Winchester disk drives and tape drives — will have to increase storage capacity and performance if they hope to compete.

The need to increase capacity is nothing new. Vendors generally increase the amount of storage that users can obtain for a given price by between 400% and 500% every five years. But less predictable changes will also occur as manufacturers of magnetic storage devices strive to keep their products in step with optical drives' performance.

Each type of device will rise to the challenge in a different way:

• Floppy disk drives. Of all the currently popular storage devices, the floppy disk drive is the most versatile. It supports a low-cost, removable storage medium and is easy to use. Most important, it can perform all the storage functions that users need: on-line, off-line and software storage. But floppy disk drives are straining to keep up with capacity and performance requirements, particularly for on-line storage.

In the next five years, the floppy disk drive market will transform itself. Today's low-capacity floppy disks, which store 100K to 400K bytes of data, will give way to high-density disks that store 1M byte or more.

• Winchester disk drives. The floppy disk's limited storage capacity leaves the door wide open for Winchester disks, which can fill most personal computer users' on-line data requirements. Right now, about one quarter of all personal computer business users rely on Winchester disks. By 1990, more than half will use them.

But Winchester disk drives have their drawbacks as well. Because the Winchester disk is a fixed medium, users cannot remove stored data from their personal computers and cannot get to that data unless the computer is operating. A Winchester disk cannot provide off-line storage or serve as a medium for storing and loading software programs.

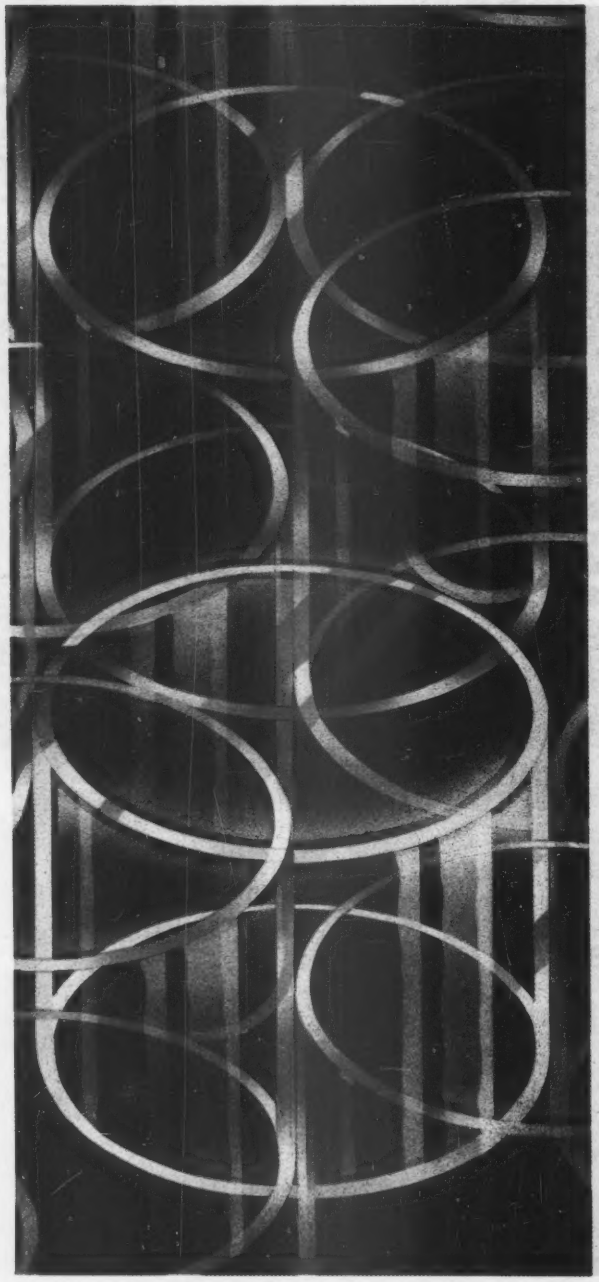
For a while, removable Winchester disks offered a glimmer of hope for off-line storage, but these devices turned out to be a disappointment. Removable Winchester technology will not gain popularity unless a major vendor endorses it, and the chances of this happening are slim.

• Tape drives. Users can supplement a fixed Winchester disk drive with a tape drive that serves as a backup, off-line storage system. Their willingness to do so has created a market opportunity for tape technology.

Until a few years ago, tape drives were nothing more than a niche product in the personal computer industry. But by 1990, ¼-in. cartridge tape drives will become standard equipment on most micros; already, they rank as important add-ons.

Before personal computer makers will package tape drives with their machines, however, tape drive manufacturers will need to offer products that fit into the same space as a 3½-in. disk drive. ■

Juliussen is president and chairman of Future Computing, Inc., a Dallas-based market research firm that publishes reports on the personal computer industry.



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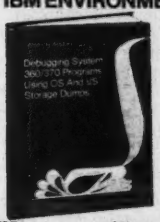

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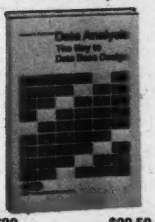

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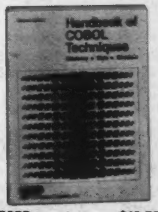

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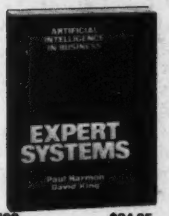

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Continued from page 42

backup and archiving, managers say, tape technology is reliable and progressing.

And the physical space problems for archival tapes are actually decreasing with the use of magnetic tape cartridges, first shipped by IBM in early 1985. IBM 3480 cartridges are about one-fourth the physical size of their 10½-in. reel-to-reel forerunners and hold approximately the same amount of data.

In addition, according to American Express' Earle, the labor costs associated with cartridges are less than those associated with tapes because cartridges do not require as much attending to as the reel varieties.

New technology. A number of technologies such as bubble memory and charge-coupled devices have challenged magnetic disk and tape devices during the past 25 to 30 years, but because magnetics maintained advantages in technology and price, the new types never became popular. Similarly, there does not appear to be any technology on the horizon that will do anything but augment existing disk and tape products.

> ***Nothing radically new will evolve in the traditional disk market for the next five years.***

Many analysts and end users see optical disk storage as the next new-wave storage technology, but optical storage suffers from a lack of standards and from the inability to write over data (see story page 36). Although the technology fits some applications perfectly — storing permanent records for a health care organization, bank or insurance company, for instance — the traditional large system DP shop is adopting a wait-and-see attitude.

"Experience has told us, if you do go into a new area . . . the first product is not always the best because there are problems or the vendor comes out with a better idea six months later," explains Bob Oshinsky, operations manager for Accredited Computer Services of Cleveland. Oshinsky's firm serves financial and savings and loans institutions.

User organizations want performance, reliability and cost-effectiveness before technological advancements, according to Luke Little, Memorex's vice-president of development engineering and technology. "Performance is a growing issue, and of course cost-performance — how many dollars per megabyte — is always an issue," he says. "We do not get a lot of requests for exotic, specialized features."

Nothing radically new will evolve in the traditional disk market for the next five years, Little says, and many vendors echo that opinion. Enhancements and improvements will continue to add capacity and performance. ■

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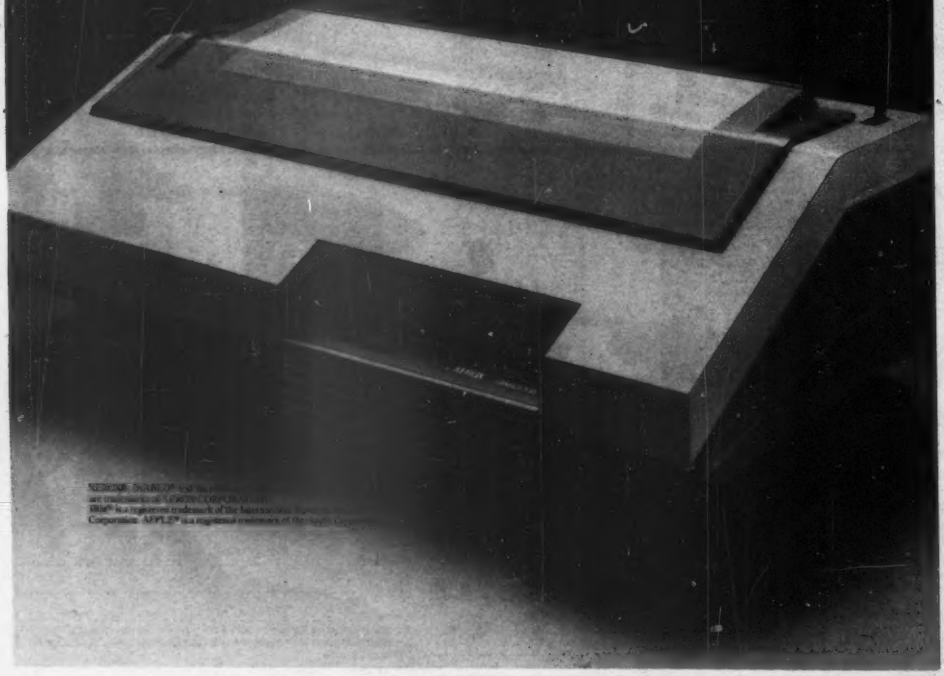

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Books, events offer more information on data storage

Readers who are interested in learning more about current mass storage technology and promising future trends may find the following publications and events helpful.

Publications

Developments in Optical Disc Technology and the Implications for Information Storage and Retrieval. R. Barrett. State Mutual Book and Periodical Service Ltd., New York. 1981.

Disk Storage Technology (GA261665). IBM General Products Division, San Jose, Calif. 1980.

Introduction to IBM Direct Access Storage Devices. Marilyn Bohl. Science Research Associates, Chicago. 1981.

Optical and Magnetic Data Storage Materials: Materials Research Society Symposia Proceedings. G. Bate et al, editors. Elsevier, Science Publishing Co., New York. 1984.

Optical Memory Report. Rothchild Consultants, San Francisco. 1985

Storage Systems Handbook. Digital Press/Digital Equipment Corp., Burlington, Mass. 1984.

Events

MARCH 11-13, WASHINGTON, D.C. — **Fourth Annual Technology Opportunity Conference on Optical Storage of Documents and Images.** Contact: Judith Hanson, Rothchild Consultants, P.O. Box 14817, San Francisco, Calif. 94114.

MAY 12-14, DENVER — **Optical Storage '86.** Contact: Cartlidge Associates, Suite M259, 1101 S. Winchester Blvd., San Jose, Calif. 95128.

JUNE 3-5, NEW YORK — **Optical Storage for Large Systems.** Contact: Judith Hanson, Rothchild Consultants, P.O. Box 14817, San Francisco, Calif. 94114.

SEPTEMBER 22-24, SAN JOSE, CALIF. — **Data Storage '86.** Cartlidge Associates, Suite M259, 1101 S. Winchester Blvd., San Jose, Calif. 95128.

In Depth

Multiuser system vs. local-area network: There *is* a right choice

ILLUSTRATION BY JON MCINTOSH

Personal computer-based networking seems more flexible, but minicomputers offer purer data integrity. DP managers should weigh CPU tie-ups and maintenance issues more heavily than acquisition costs.

By JOHN DOUNIS, SHARON EFROYMSON and LYLE ANDERSON

Often the most elementary decision in automating a department is choosing which multiuser solution to implement — a personal computer-based local-area network or a true multiuser shared-logic system, such as a minicomputer or multiuser microcomputer. The answer is rarely black and white.

The technologies are complex primarily because of the rapidly changing software products available for local-area networks, personal computers and end-user computing.

Unfortunately, many departments of large corporations have invested in local-area networks as their multiuser solution for the wrong reasons. In many cases, managers of end-user departments implement their systems on a local-area network to get away from MIS, which they feel does not respond to their needs. In other cases, users who have no MIS experience feel that anything that can be implemented on a minicomputer can be implemented with personal computers and a network.

Too often, managers do not perform a needs analysis, nor do they consider long-range goals. They then purchase networks on the basis of a single item, such as cost, and those networks fail because users do not consider network performance, growth, applications or how the system fits into the overall systems architecture.

In most cases, a careful evaluation will reveal that either alternative will meet some of the company's requirements. Weighing the trade-offs forces managers to determine what scale of system is needed, based on a complex matrix of current and anticipated needs.

Minicomputers are traditional computer implementations, while network-based and multiuser microcomputers are relatively new. Each offers different strengths and can be a real asset in the right setting. In the wrong setting, each can be a real lemon.

Dounis is the director of systems development and consulting for the Center for Advanced Data Processing, Inc. (CADP) in New York.

Efroymson teaches personal computer communications to corporate clients at the Productivity Center of CADP.

Anderson is a principal at DMR Associates, Inc., White Plains, N.Y., specializing in end-user computing and systems planning.

A successful implementation

One of New York's prominent financial organizations implemented a local-area network, which kept costs down and solved many operational problems. The network was implemented in a division with about 100 investment analysts working on projects for different clients.

In the past, the firm had installed approximately 40 personal computers, which analysts used for spreadsheets and communications with outside time-sharing services. The analysts found the personal computers to be useful tools and had already converted most of their financial analysis procedures. Most of the personal computers, however, were located in the information centers, with few found on the individual's desk. Analysts assigned to specific projects generally worked in the same room and passed information back and forth by copying files onto diskettes.

The firm then moved its offices and decided to double the number of personal computers as it redesigned the office. The new personal computers were installed where they were most needed — in the end users' offices. A needs analysis revealed that the firm needed a multiuser system of some kind to make sharing data more efficient.

A local-area network seemed the best choice for the following reasons:

- The end users required minimal concurrent access to data bases or files. Their applications, primarily spreadsheets, were heavily CPU-intensive. Shared-logic systems would not provide equivalent performance in the same price range — they were signifi cantly slower for these applications, which would severely limit productivity.
- Sharing peripherals was a key need. The cost saving from not having to purchase enhanced personal computers and printers in this case more

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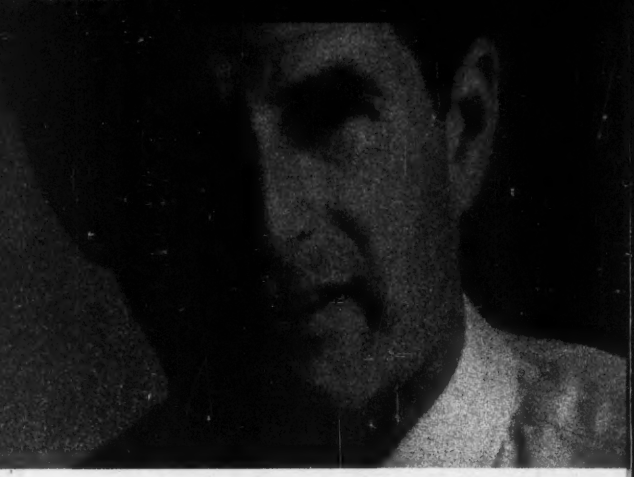

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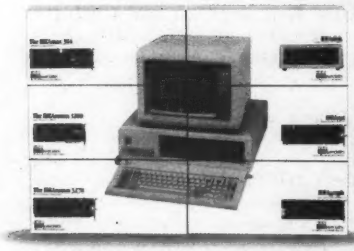

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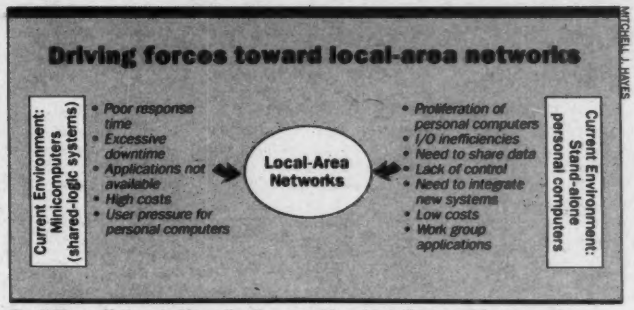
than offset the additional cost of the local-area network equipment. While a minicomputer could provide resource sharing, the firm's managers felt that the additional administrative and operational costs of the system would be prohibitive.

• Analysts often worked under tight deadlines, so system reliability had to be extremely high. While shared-logic systems inherently offered greater reliability, this advantage did not need to be sacrificed with the local-area network system. A spare server was acquired so that if one component failed, another personal computer or server could be used.

• Office locations were constantly changing, and personnel were always being added, making the flexibility of reconfiguration imperative. A shared-logic system would require that time-consuming utilities be executed whenever a terminal was added, whereas the local-area network solution would allow users to simply "plug in" to the system.


Driving forces toward local-area networks
Current Environment: Minicomputers (shared-logic systems)
• Poor response time
• Excessive downtime
• Applications not available
• High costs
• User pressure for personal computers
Local-Area Networks
• Proliferation of personal computers
• I/O inefficiencies
• Need to share data
• Lack of control
• Need to integrate new systems
• Low costs
• Work group applications
Current Environment: Stand-alone personal computers
MITCHELL J. HAYES

Flexibility, off-the-shelf applications and local intelligence drive users to consider personal computer-based local-area networks as their multiuser solution. Nets also can protect users from experiencing excessive downtime.

Ending diskette derby

After using the new departmental system for several months, management found that productivity among the analysts had steadily improved. The analysts were creating libraries of standard work sheets and sharing them.

Electronic mail also enabled analysts to zap messages and spreadsheets to other users, eliminating the diskette derby routine.

However, even in this firm, the local-area network solution could have been improved upon. The same company had installed minicomputers to provide word processing and office functions to the secretarial staff.

Management found that the minicomputers offered the advantage of a single integrated environment for shared applications, documents and lists but could not effectively handle spreadsheet work at the local workstations as the personal computers could. However, because of the firm's heavy investment in the minicomputers, it had to make use of them.

Here, the benefits of using personal computers and the limitations of minis far outweighed the firm's desire for a single integrated environment. Therefore, it was willing to install a second network connected to the minicomputers for the secretaries to use for word processing and administrative applications.

Even though it would have been more efficient to support both types of users on a single network and allow them to transfer information back and forth, the strength of each alternative, for its particular use, forced the company into a dual-computer environment.

The investment firm has implemented the best solution for today, with an eye to the future. When an interface between the two systems becomes available, the firm plans to move to a shared environment. Then, with both personal computers and minicomputers hooked to one network, analysts can create documents and send them to the secretaries for final editing and distribution.

In addition, the heavy spreadsheet use on the personal computers will not bog down the minicomputers, so both the secretaries and analysts can get good performance.

Benefits of networking

The above examples illustrate a key point: Since both local-area networks and shared-logic systems offer benefits and force trade-offs, users must determine how to compensate when the chosen solution falls short.

Flexibility is the main asset of a local-area network implementation. Users can purchase off-the-shelf software packages and retain the benefits of the intelligence inherent in personal computers. Networks also facilitate utilization of already installed equipment.

Since information is processed at the intelligent workstation and not at the network server, there is greater protection against failure of the entire system. In many cases, if an IBM Personal Computer XT or AT has been defined as the server and it fails, another may be installed in its place (with some swapping of boards), and the information may be restored with minimal downtime.

Local-area networks were considered a fad by many users, but with introductions like IBM's PC Network, most users feel confident that personal computer-based networking is a solution with a future. The introduction of IBM's PC-DOS 3.1 and Netbios provided a standard, encouraging many hardware and software vendors to offer a variety of local-area network environments.

When users evaluate alternatives

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for implementing departmental computing, they often fail to see the forest for the trees. Some in smaller shops may be intimidated by slick shared-logic system salesmen or overwhelmed by the technology. Understandably, these users prefer shopping at the less intimidating computer stores — where, unfortunately, they are often sold off-the-shelf solutions, which do not allow for a cohesive departmental direction for the future.

A shaky implementation

As a result, some implementations do not match the success of the investment firm described earlier. For example, another financial organization needed a system to process general ledger and accounts receivable transactions for its real estate division.

The management, not being systems oriented, failed to perform a needs analysis, review the requirements or evaluate alternatives. On the advice of the local computer store, the company implemented a system that incorporated five personal computers and a local-area network. After implementation, numerous operational problems surfaced, including the following:

- Long batch updates degraded the network.
- As updates were being performed, end users were often locked out of the application.
- System integrity corrupted files in several cases.

Division managers failed to realize what is involved in maintaining a multiuser environment. Understanding and following procedures, maintaining manual controls and performing daily backups were foreign to them. In the end, they realized the only recourse was to start again from the top: to pull out the local-area network system and replace it with a minicomputer.

A consultant was brought in, and many of the problems were resolved with more appropriate applications software and a solid systems approach. The minicomputer alternative offered the data integrity and control that was needed for the accounting applications and that was sorely lacking with the network.

The firm's environment was high-transaction application specific, I/O dependent and required tight controls over data integrity and end-user interfacing. A detailed needs analysis would have clearly shown the shared-logic system as top choice.

Shared-logic systems

Multiuser — or shared-logic — systems are generally less flexible than personal computer-based networks but offer other strengths. These systems utilize dumb terminals connected to a central mini or microcomputer, in which all processing occurs. At this system's heart is a sophisticated, multitasking operating system that manages the system's resources and grants all end users their share of CPU, memory and I/O resources. Shared-logic systems generally do not use intelligent workstations; where they do, the system views them as dumb terminals.

In most cases, shared-logic systems offer data integrity that is superior to local-area networks through facilities such as forward recoveries and transaction back-outs. However, when a hardware problem occurs with the central computer, the entire user community goes down until service arrives.

Furthermore, when shared-logic systems need additional capacity, they are generally expensive to upgrade. Across the board, software is usually more expensive per package than personal computer counterparts, but one copy is licensed for use by all terminals on the system, reducing overall costs. In the end, software costs may or may not be lower per user, depending on the package and number of users.

Both local-area networks and shared-logic systems provide record-level and file-level lockout, although the way that it is accomplished is significantly different. Most shared-logic system applications enqueue or reserve the resource within the operating system or hardware. The local-area network workstation, however, issues a semaphore that requests that the server lock or unlock the resource by adding or deleting a record in a lock table at the server.

If a transaction fails after locking a resource, the shared-logic system will automatically dequeue or

Some of the industry's toughest critics say the nicest things about PARADOX

PC MAGAZINE January 14, 1986

Ansa Software's Paradox commands attention as a high-end database manager. Not only is it fast and easy to use, but it combines the best features of 1-2-3, dBASE, and Infoscope with its own to make one impressive program.

PARADOX
A DATABASE MANAGER WITH A FAMILIAR FACE

You need a pretty good product just to break even in the database marketplace, but some people are betting that a new high-end database management system (DBMS) called *Paradox* will do much more than just break even, despite the tough competition.

Ben Rosen, a major backer of Lotus Development Corp.'s successful start-up, has given his financial imprimatur to the fledgling Ansa Software and its flagship product, *Paradox*, in the hope that *1-2-3*'s formula for success will work again. Success seems likely because *Paradox*'s designers, Richard Schwartz and Robert Shostak, have intelligently recognized that the familiar sells. They have borrowed the best elements of the market leaders and combined them into a product that goes beyond the best-sellers while remaining compatible with them. Ansa is marketing *Paradox* as a "better" alternative to popular products and as an "upgrade" for *1-2-3* users who want more DBMS power and *dBASE* users who want a better visual interface and an expanded programming language.

Paradox borrows *1-2-3*'s two-line menu interface and cell format, offers a *dBASE III*-like structured programming language, and takes some advanced features from Microstuf Inc.'s highly rated *Infoscope* DBMS, such as its ability to modify the size and contents of database fields using on-screen graphics. *1-2-3* and *dBASE* users will quickly find themselves at home with *Paradox* and will easily be able to exchange files between the new program and their old favorites.

Paradox is friendly, fast, and loaded with features. It also requires a lot of memory to run, eating RAM and disk storage space like IBM consumes Intel chips. According to its manual, *Paradox* needs 512K bytes of RAM to run, and the program will let you know right away if all that space isn't available. If you have insufficient RAM, *Paradox* will put an error message on the screen and refuse to sign on. You also have to increase the number of files and buffers reserved by the CONFIG.SYS command when the system boots, or *Paradox* won't have enough space to work. Forget about RAMdisks of any practical size. You might even find it hard to use print spoolers in RAM or RAM-resident programs waiting to take control of the screen.

You can run *Paradox* on a floppy-based PC, but if you want to create applications that do a lot of computations in arrays, you had better also allow a free megabyte of hard disk storage space for *Paradox* to write the array data. It's a great excuse for upgrading your system because it gives you a lot of power in exchange for all those bytes it eats.

Paradox can do big jobs. A single data table can have up to 65,000 records, and because the program allows multiple tables, you will surely run out of data storage space before the program runs out of data-handling ability. It can do fast, informal inquires into more than one table at once and combine the results for placement into a

Frank J. Derfler, Jr., is a contributing editor of PC Magazine.

This review is unedited. The text has been reprinted in its entirety from PC Magazine, January 14, 1986, ©1986 Ziff-Davis Publishing Company.

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Since both local-area networks and shared-logic systems offer benefits and force trade-offs, users must determine how to compensate when the chosen solution falls short.

release the resource; the local-area network, however, may not (because the application died before the unlock semaphore was issued), and the system administrator may shut down the system to free the erroneously locked records and files.

Therefore, with local-area networks, workstations and end users must follow exact set rules for locking and unlocking resources. With shared-logic systems, the central operating system manages these resources.

Unlike the shared-logic system's proprietary operating system, local-area networks allow personal computers to utilize the standard DOS operating system. This means that most user software packages that have been developed for IBM's PC-DOS or Microsoft Corp.'s MS-DOS can function on the network.

However, this does not mean that all software will run on the network in a multiuser environment. In many cases, when a vendor says that the software will run on a network, users interpret the statement to mean that the software will provide record-level lockout.

The vendor may actually mean that the software will run on the network properly only as multiple single-user systems.

Evaluation factors

Knowing the strengths and weaknesses of local-area networks and shared-logic systems prepares the foundation for choosing among the alternatives. The following is a checklist of important considerations:

1. What applications will be used? This question is of the greatest importance. Will the system be primarily used for high-volume, transaction-oriented applications? If the system is for general use (such as word processing, spreadsheet and so on), the personal computer alternative with the local-area network should be employed.

If the system will be used primarily for high-volume transaction applications, then the shared-logic technology should be heavily favored. In these cases, the shared-logic systems will be more cost-effective, and the software will be more likely available for a specific application.

Local-area networks are an effective solution for automating work groups in certain situations. For example, a network-based system is appropriate for office automation or personal productivity applications that are primarily oriented toward individual users. However, a large multicompany accounting system, with several users constantly retrieving and updating data, is better installed on a shared-logic system.

A limited variety of multiuser applications software for networks precludes their use in some situations. But recently, many developers have released their packages in networked versions, so this limitation is becoming less of an issue.

2. The performance characteristics should be evaluated. Will the system be I/O bound or CPU bound? If CPU bound, the personal computer with local-area network solution should be implemented. Since the network is tapped only when an individual file is being loaded or saved, the CPU performance degradation will affect only the workstation utilizing the CPU cycles — not the network.

Intense spreadsheet applications, for example, are CPU intensive with little I/O, so they are usually better implemented on a network-based microcomputer system. The workstation that is processing the application

form on the screen or printer. You can use the formal programming language to design input screens and function menus and to write complex data inquires resulting in formal reports.

But *Paradox* queries don't have to be just informal (temporary programs) or formal (permanent programs). You can quickly create permanently recorded inquiry macros tailored to a specific application that you can replay with a single keystroke anytime you need them.

1-2-3 or *Multiplan* users will feel familiar with the *Paradox* two-level horizontal menu, which uses the second line to explain the features highlighted in the top line. The cursor movement and command selection methods are the same as those in *1-2-3* and *Multiplan*, but you bring the menu to the screen by touching the F10 key instead of the slash (/). The F1 (help) key brings up screens of text that follow the *1-2-3* pattern of allowing you to branch to explanations of other related subjects. Ansa has even supplied a hard plastic *Paradox* function-key template (similar to the one Lotus supplies with *1-2-3*) that describes key assignments in the Alt and unshifted modes.

Like *1-2-3*'s own primitive database, *Paradox*'s primary interface uses a spreadsheetlike format that lets you see the horizontal and vertical relationships of records (rows) and fields (columns). Some database systems only allow you to write lines of program code in which you describe these records and fields in words. *Paradox* shows you the columns and rows and allows you to enter, retrieve, and manipulate data according to these horizontal and vertical relationships.

Advanced *1-2-3* users will appreciate *Paradox*'s ability to build macros. The Alt-F3 key combination tells the program to record the keystrokes that follow. You can run through a complex sort-and-retrieval using the menu or issuing commands, and the program will capture every keystroke. Keying in Alt-F4 plays the recorded keystrokes back. A menu selection lets you attach the "recording" to a particular key combination so that you can replay it any time you need it.

Although *Paradox* has many features in common with *1-2-3*, it's not just another *1-2-3* clone. Nor does it do all that *1-2-3* does by any means: *Paradox* has math functions, but it does not claim to be a spreadsheet. *Paradox* doesn't have *1-2-3*'s graphics or its ability to easily create extended formulas that apply to only one cell.

Paradox goes beyond *1-2-3*'s database capabilities to match such full-function DBMS programs as *dBASE III*. It can work on more than one table at a time and on more data than can be held in RAM. It also has a full-featured procedural language, the Paradox Application Language (PAL), which has a syntax and program structure similar to that of the *dBASE* language. PAL's commands are often identical or quite similar to the corresponding *dBASE* words, but it has more of them.

If you are a *dBASE* programmer and you keep Ansa's cross-reference guide at your elbow to tell you that INPUT has become ACCEPT and LIST has become VIEW, you'll be able to start writing PAL code right away. You will probably like *Paradox*'s built-in functions, which let you check the status of a specific disk drive, find the name of the current active directory, and check the keyboard buffer for characters that might otherwise be lost. You might also find uses for the *Paradox* features that build arrays and perform trigonometric and statistical functions, including logarithm arccosine, arctangent, maximum, minimum, average, and standard deviation.

PAL has excellent functions for controlling the printer and constructing data input or report screens that take full advantage of the PC's display, whether color or monochrome. It is a very complete DBMS language, but unlike other such complete languages as SQL, it's easy for someone raised on BASIC or Pascal to use.

Paradox's high-quality screen displays help you edit data, change the way answers to your inquiries are displayed, and actually make the inquiries. A unique image-scrolling feature also lets you see how you got to where you are and go back through the looking glass to change what you did.

This on-screen editing is a real boon to DBMS users accustomed to programs that let you review and edit data only record by record, which is like sorting through a stack of 3- by 5-inch cards one at a time. *Paradox* lets you take a full-screen look at your database and then move around to spot errors or change data with an on-screen editor. Edited data becomes a permanent part of the database.

You can also use the screen-display command ALTER to change the configuration of the displayed tables you get as answers to data queries. If you have made a query into the database and the answer is a large display of records, *Paradox* will allow you to change fields around, alter the size of fields, and generally reconfigure the resulting table to meet your immediate needs. Unfortunately, *Paradox* will not allow you to make permanent changes to the configuration of the database through on-screen manipulation as *Infoscope* will and it doesn't use color as well as *Infoscope*, but ALTER is valuable for displaying practical answers to your database queries.

The program also has an interesting screen display that will help you make informal queries. *Paradox* displays an image of the fields available and allows you to place a check mark (created by special programming of the F6 key) in the fields holding data you want to see. You can also set conditions in the fields such as >= 10,000 or = Smith. You can put conditions on every field or just put limiting conditions on one field: >= 100, <= 500 will show you all records with amounts between 100 and 500 in that field.

This informal query procedure lets you set either-or conditions such as "live in California or drive a BMW" and have the flexibility to handle upper- and lowercase entries and other variables. The process is easy to use and fast.

Putting data into *Paradox* is a joy. *Paradox* has an excellent data import and export function that can easily and quickly handle *1-2-3*, *Symphony*, *dBASE II* and *III*, *PFS:FILE*, and .DIF (*VisiCalc* and others) and ASCII files. I created and exchanged files with *1-2-3* and *dBASE III* with no problems. Importing the PC Magazine Labs test files took only a few minutes. *Paradox* even found the two records with incorrectly formatted data and presented them for correction.

Unlike the frustration of report writing in many other DBMS languages, *Paradox*'s easy information retrieval was a pleasure. After a few retrievals for training, I could select four or five fields from three data files and have them correlated, sorted, and displayed in less than 2 minutes.

To produce reports summarizing or manipulating data drawn from several files, I used a *Paradox* menu selection called Report. The Report function displays the form on the screen and allows you to insert and write the specifications for new fields as quickly as you could in a spreadsheet. It takes about 2 minutes to make the request and less than a minute for it to appear on the screen.

I performed all the PC Magazine Labs benchmarks using *Paradox*'s menus and special function keys—I didn't have to use PAL for any of these retrievals or reports. I am convinced that even an expert *dBASE* programmer could not have created the application more quickly in code than I did on the screen. However, anyone using PAL would be able to do more complex mathematical functions and format printed reports better in code than I could on the screen. Programmers could also create better security protection for files and screens that make better use of color.

Ansa's copy-protection scheme gives you a choice between flexibility and ease of use. If you run an installation routine, you can put *Paradox* on your hard disk and not have to keep a program disk in drive A: for verification when you want to fire up the program. If you install the program, you will have to uninstall it before you can move it over to another machine. (The data files you create are portable.) But if you want more flexibility, you can just move the program files over to the hard disk and keep the original disk in drive A: for verification when *Paradox* signs on. In this way, you can have one copy of the program that you can run at home or in the office—but not in both places at once.

Paradox's excellent manuals include clear illustrations of the screen and keyboard and references to other related topics. I particularly like the two slim volumes of special information included for *1-2-3* and *dBASE* users. Armed with the appropriate volume, anyone familiar with either of these programs can be effectively using *Paradox* in minutes.

I was able to do complex work with *Paradox* minutes after I inserted the first disk, but after spending 7 full days working with the program, I was still finding important features. *Paradox* is obviously the result of years of effort. It shows the signs of true class in the way it smoothly handles errors (polite English prompts) and quietly keeps files of changed data so that you can recover from dumb mistakes.

To qualify as a Category 4 database under *PC Magazine*'s classification scheme, a DBMS must have a method of doing informal queries with Boolean conditions, such as IF, THEN, or ELSE, and it must also have a procedural language. The procedural language must contain structures such as loops and GOTO statements and enable the programmer to build applications that nonprogrammers can use interactively to enter and maintain database files. *Paradox* meets these criteria.

Category 4 products must also in some way set a standard in microcomputer database design. *Paradox* meets this test through its provisions for on-screen visual interaction with the database and its attempts at compatibility with widely used programs from other companies.

Other members of Category 4 include *dBASE III*, *KnowledgeMan*, *Power-Base*, and *INFORMIX*. On the whole, *Paradox* can match or exceed the performance and features of any of these programs. It does, however, lack the natural-language features of *KnowledgeMan*, *INFORMIX*, and some other Category 4 programs that let these programs parse phrases entered in ordinary English looking for important discriminating words while ignoring unimportant articles and adjectives. *Paradox* substitutes an efficient visual checklist for typed queries and neatly sidesteps the need for natural-language recognition.

Paradox is impressive on the surface, and the deeper you go, the more the feeling grows. It is fast, capable, easy to learn and use, and well documented. It also costs a steep $695 and takes a fully stuffed PC to run. This price (the same as *dBASE III*'s) shows that *Paradox* is aimed at Ashton-Tate's heart. Even at those prices, neither product is perfect for every application, but *Paradox* is easy to use and offers high-end programming power that should attract the attention of many corporate, government, and institutional buyers. ■

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will experience CPU degradation, but that will not affect other users on the network.

If the system is I/O bound, it is probably high volume and application specific and belongs with the shared-logic alternative. Since I/O-intensive applications are constantly calling upon the file server for records, a slow file server will bog down every workstation on a local-area network.

3. If data sharing and data integrity is the desired goal, then local-area networks tend to be less than satisfactory. The hardware and software environments available for shared-logic systems are better able to manage concurrent requests for information from data bases. Many of the shared-logic alternatives, besides providing file and record locking, offer transaction logging and recovery facilities that, unfortunately, have been overlooked by the publishers of personal computer software.

4. If peripheral sharing is the primary requirement, a local-area network would be the preferred alternative. Sharing resources is a primary need for many organizations for convenience and cost reduction. It also provides an expandable environment for users; as needs grow, the incremental cost of adding resources is relatively low.

Expanding a shared-logic system, however, can be costly and would greatly complicate changes in the configuration. The system may require a complete change of the CPU or changes to the operating system environment that cause ongoing problems to the users.

5. If ease of applications development is a major requirement, in most cases, the personal computer-based local-area network solution would be the first choice. Personal computer software has traditionally offered the user greater ease of use, and it is now graduating to the multiuser world. Multiuser productivity systems such as the recent releases of Fox Research, Inc.'s multiuser Rbase 5000 and Ashton-Tate's Dbase III/Plus now will allow many stand-alone applications to be converted to multiuser environments, and the existing user base means expertise in these products is already available.

However, shared-logic system vendors have seen the impact of the easy applications development tools available for the personal computer; many fourth-generation languages, which provide greater ease of use, have been developed for shared-logic systems using popular operating systems.

6. If system growth is an issue, the personal computer with local-area network solution wins again. Local-area networks are flexible when it comes to upgrading. As you add users on a shared-logic system, each gets a smaller slice of the existing CPU and main memory pie. Eventually, when the system runs out of resources, expensive replacements or upgrades are required.

When workstations are added to a local-area network, degradation is minimal because each brings its own CPU resources with it, instead of draining the central shared-logic processor. When network performance does degrade, it is usually due to contention (long queues of I/O requests) at the server.

To compensate, many local-area networks allow multiple servers to be added inexpensively within the same transport level. Server contention is relieved by migrating some of the I/O to the secondary server or servers. Secondary servers also provide the users some redundancy, which proves valuable if the primary server fails. Isolating applications to servers prevents an entire department from grinding to a halt during a crash, since the applications and data on secondary servers are still available for some users.

7. Where all the users are widely dispersed among several buildings, a local-area network generally is not appropriate. Recently, however, some vendors introduced microwave and infrared links for that purpose, which may be an option.

Traditionally, shared-logic systems provide for wide-area access. However, all cables must go back to the central host, and if the users are in a different building from the computer, expensive multiplexers and telephone circuits are required.

Local-area networks are made for use within a building. With a local-area network, all the pieces of the system — the servers, workstations and so on — can be located in the same area as the server, and often only one cable needs to be dropped between floors.

8. If remote access (dial-up) is frequently required, then the shared-logic system alternative is best. Local-area networks are oriented toward use over limited distances — generally within a building. Although remote access to a local-area network is available, performance is generally poor, and users are required to carry special diskettes with the network operating system and programs.

9. Does management want end users to control the data? In many corporations, although departmental managers want the data to be controlled by their end users, MIS managers often want all of the information secure in the data center. A local-area network requires that management allow data to be decentralized and placed under user control.

Often, because of security or auditing reasons, decentralizing data under user control is not a viable approach. Consequently, management may choose a shared-logic system because the central computer, its tapes and disks can be placed in a highly secure data center.

10. Will the end users take responsibility for the data and for

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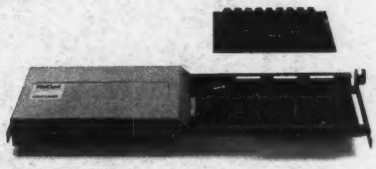

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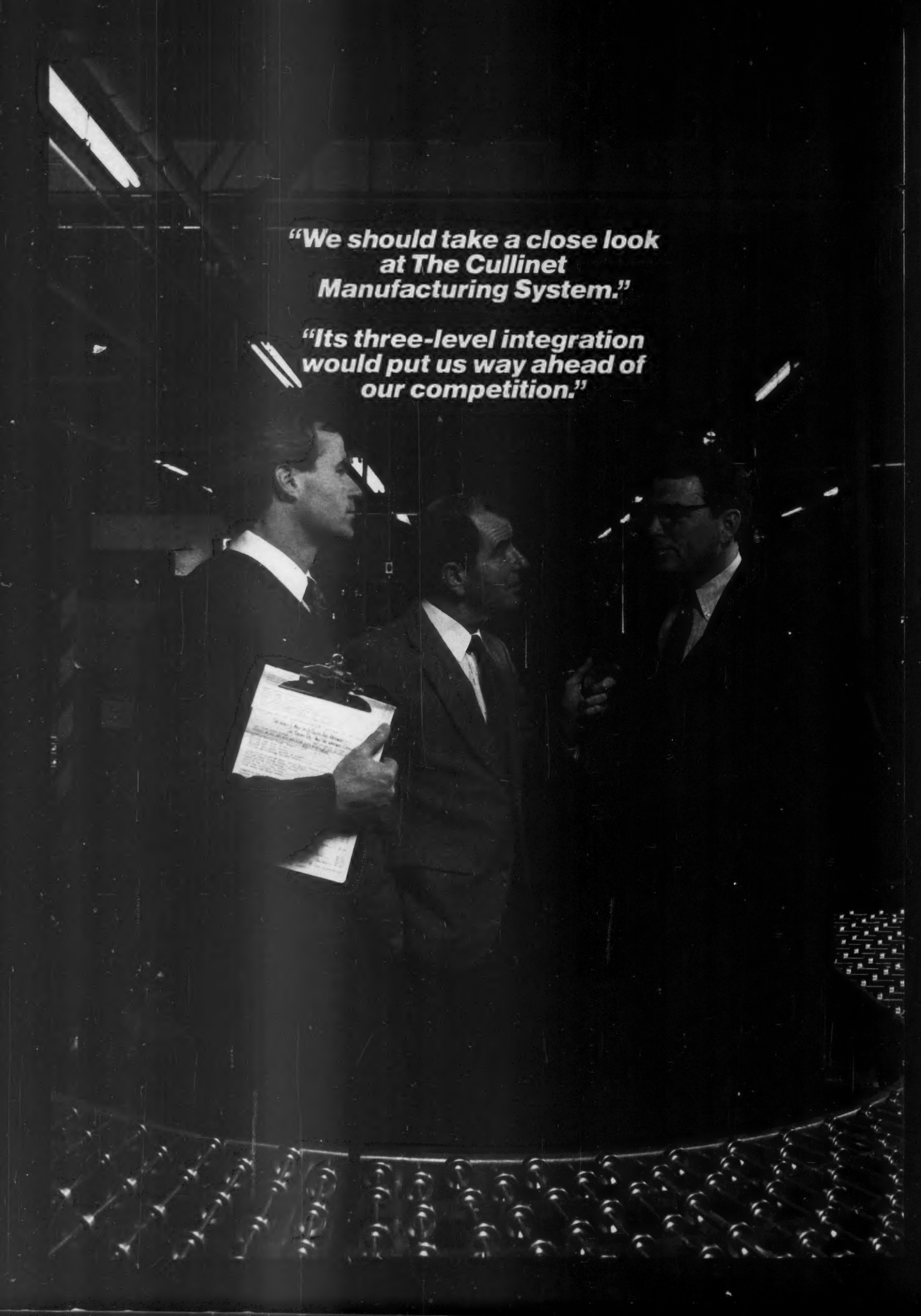
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the operations? Implementing either alternative requires a commitment of responsibility from them. With local-area networks, end users must take the responsibility for performing backups on a timely basis.

A local-area network needs care and feeding. Depending upon the size of the network, a part-time or full-time administrator must be appointed to be responsible for the resources. Network administrators make sure that resources are equitably distributed among users. They also provide data integrity functions (backup, restores and so on) and are available to help new users operate on the network.

One of the biggest problems local-area network users encounter is the need for more and more disk storage. Network users must take responsibility for space management and archive, on diskettes or tape, the files that they will never use again.

Centrally controlled shared-logic systems are more appropriate in situations where users are unwilling or unable to take responsibility for systems operations. Trained, professional operators, using appropriate procedures and controls, make sure that the systems are properly backed up and that resources are managed well.

> ***The gap between the local-area network and shared-logic system approaches for end-user computing will close as departmental computers gain strength in the marketplace.***

11. Are gateways to other computers required? At the present time, only limited communications gateways are available for local-area network-based systems. At this time, applications that must be integrated with other large-scale systems are probably better implemented on a shared-logic system that includes the appropriate distributed communications software and controls.

A shared-logic system, for instance, would work better for a company with many divisions developing financial information to be ultimately consolidated in a corporate mainframe. In this case, distributed communications among the different computers may be important both to ensure that data is transferred on a timely basis and that only accurate data is maintained in each system.

In the future, with the implementation of the kind of Advanced Program-to-Program Communications that IBM envisions, local-area networks should be able to provide similar integrity and control among systems and different networks.

12. Will the network connect many different vendors' products? With a local-area network, the best and most cost-effective solution can be chosen for each application while maintaining a compatible environment for sharing resources and information.

For example, many companies are installing Apple Computer, Inc. Macintoshes for in-house publishing. They still want to develop documents on IBM Personal Computers but would like to transfer them to the Macintosh for final printing. Some networks, such as those from Corvus Systems, Inc. or 3Com Corp., allow both Macintoshes and IBM Personal Computers to hook up to the same network so end users can transfer files from one to another. The different computers can also share disk storage and printers.

Standards being implemented for local-area networks will enable a variety of hardware vendors to interconnect and share data, applications and resources through strictly defined interfaces. However, in most cases, shared-logic systems still confine the user to the system's proprietary devices, with minimal connectivity to other vendors' devices.

Multiuser costs

In evaluating departmental computing alternatives, managers must consider a variety of criteria. Cost of acquisition is a consideration of primary importance; however, it should not be weighted as heavily as other system requirements.

Often, elusive hidden costs are overlooked when comparing options. Hidden costs include ongoing maintenance and support charges over the life of the system, as well as costs for upgrades and new releases of system software.

Shared-logic systems need sophisticated maintenance contracts so that they can be quickly repaired with minimal downtime; in most cases, personal computer-based systems do not. If a personal computer fails in a network, it can be swapped with a spare while the original is being repaired at a shop.

Methodology for analysis

An objective needs analysis must be performed from the start. It is essential for decision makers to complete the following steps:

- Understand the overall systems environment. Most organizations have established some type of strategic direction for information processing, and this direction must be considered and related to the available range of options.

Sometimes this mandate provides viable alternatives for a particular problem. Unfortunately, it can also

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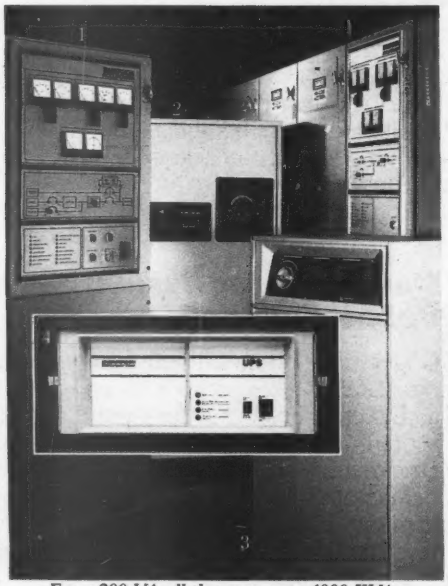

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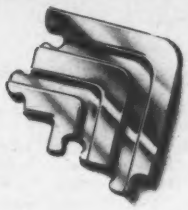

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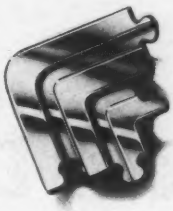

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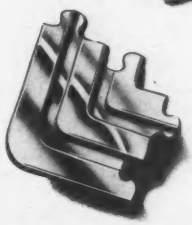

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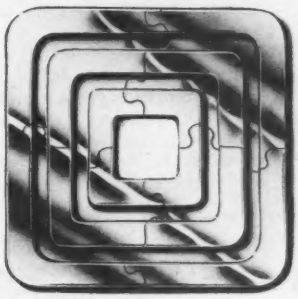

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needlessly restrict viable options for the department.

For example, one financial company dictated that all office functions would be provided through a series of Wang Laboratories, Inc. minicomputers with word processing workstations. However, the financial analysis department needed a powerful personal computer-based system to operate its Lotus Development Corp. spreadsheets.

In this case, a personal computer-based local-area network solution would have been more appropriate because the financial analysis department could print spreadsheets locally and use less expensive hardware and software. But the right alternative could not be implemented because a limited, strict architecture defined by the organization resulted in increased cost, reduced reliability and a very complex environment.

The trade-off between an individual department's needs and those of the organization must be considered. Will the individual department's approach conflict with the organization's overall architecture by not being connectable or compatible? Or do the specific needs of the particular department, as in the above example, take precedence? This question often becomes a management issue that needs to be resolved internally.

• Analyze user requirements to determine the level of program and information sharing. A portfolio of functions and applications for each user should be developed. This step is critical to the analysis because it will become the basis for determining storage requirements and the amount of workstation power required for each user.

User surveys and interviews should be conducted to determine the mix of functions and whether the user performs repetitive, structured work or ad hoc, unstructured work. Logs are also useful to document the time spent on different tasks to determine priorities and frequency of use. The user's future needs will also become apparent.

The process is two-way: educating users about their possible options and finding out which ones fit. For example, many users want an electronic mail system. But do they really need E-mail? In many cases, a shared storage volume may be all that is required for work sheets and other documents they want others to use.

Analyzing source documents, current computer usage and communication with other users and departments will help to determine what categories of information are being used (text, graphics, numeric data, voice and so on) and to what extent information is shared with other users.

The primary sources of information will need to be identified. Are they all within the same department, on the corporate mainframe or external to the organization? It is important to determine whether users need to communicate frequently with other departments. A flowchart may be needed in some environments.

• Determine security requirements. In evaluating security needs, user requirements need to be addressed, and the options need to be reviewed. For example, is access security sufficient or are users to be prevented from accessing specific files on the system?

• Review the physical environment. Its constraints and requirements must be documented. An inventory of the installed base of equipment and physical requirements is very important. Are all the users in the same building or on the same floor? Do specific restrictions exist? Is the building an explosives factory that requires the use of fiber-optic cables?

It must be noted whether there is any previously installed equipment and whether its usefulness can be preserved. All current hardware must be identified to determine the incremental investment required.

Impact of future change

The gap between the local-area network and shared-logic system approaches for end-user computing will close as departmental computers gain strength in the marketplace. This hybrid approach will take the strengths of both systems and combine them into an environment that can provide an integrated solution for end-user computing.

As the CPU grows ever more powerful within personal computers, it is possible that the personal computer will become a shared-logic system connected to the local-area network, that in turn is connected to a mainframe — and a limited number of dumb terminals can connect to it. The list of future connectivity options can grow endlessly.

For example, the departmental computer will function as both a server for the local-area network and an application processor. The time may soon come when users will be able to share disk storage on the departmental computer and also run applications on a server while using their workstations as terminals.

More software will appear on the market for local-area network-based multiuser systems, and the data integrity features lacking on local-area networks will be implemented. Local-area network vendors are also preparing their systems to provide hardware redundancy with advanced integrity features.

In time, shared-logic systems that run applications and work as file servers for a local-area network will become available, which will enable users to take advantage of the best of both alternatives. In the meantime, organizations must position themselves for flexibility, providing users with a solution that works but also one that is expandable and can accommodate new technology as it is introduced. ■

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In Depth

Lawsuits may choke U.S. software industry

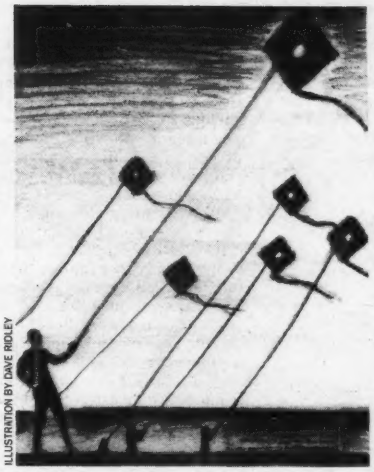

ILLUSTRATION BY DAVE RIDLEY

Since we are by nature imperfect, lots of things go wrong. But a tort law system that holds the software vendor liable for every accident or clumsy purchase under a strict liability doctrine is killing the industry's entrepreneurial spirit.

By RICK MARTIN

Did you ever buy software that didn't work? I'll tell you what. Why don't you sue the son of a gun who sold it to you!

I bet if all of us who have purchased imperfect software got together and sued all the software vendors, we could close down everybody in the software business except IBM. Wouldn't that be great? Imagine, only perfect software made by IBM would be on sale in the U.S.

More than 10,000 businesses employing more than half a million Americans would disappear. Unemployment would climb. Plentiful supplies of low-cost software packages would no longer be available to U.S. computer users. The U.S.' international economic competitiveness would decrease. More jobs would be lost. Computer hardware sales, which rely on readily available applications software, would plummet and cause a national depression.

Does this sound like an international plot to overthrow the United States of America? Well, it isn't. We are doing it to ourselves. The entrepreneurial spirit that built this nation is being killed by a fatally defective tort law system. Clumsy purchasers, accident victims and contingency fee lawyers will soon seem to rule the nation.

What is a tort? In a nutshell, it is anything that goes wrong that is not criminal. That includes most airplane disasters, car crashes and faulty software.

Since we are by nature imperfect, lots of things go wrong. Therefore, we are surrounded by torts. The deep, philosophical question that Americans must face up to is this:

If I become a victim of a technology-based disaster such as faulty brakes, should I become a wheelchair millionaire, or should I receive free medical service and return to as productive a life as possible?

Please vote on this question soon. But before you vote, read on.

America means progress. Progress means creativity. Creativity means jobs. In this half of the world, jobs exist only if they help create a reasonably competitive product or service. When the employer has to pay millions of dollars to those who suffer from bad dreams ("pain and suffering" in legal terminology) or lack of sex ("loss of consortium") because of the use of his product, then the employer can no longer create a reasonably competitive product.

Things are so far out of hand that the new president of the American Bar Association predicts a national superfund may be needed to insure all businesses against monumental lawsuits. This would add another unbearable burden to the federal deficit. Good-bye America.

In the Old West, while the U.S. was bursting with growth, energy and creativity, if you shot your foot off while horseback riding, you limped for the rest of your life. Today, you hire a contingency fee tort lawyer and choose one of these options:

- Sue the gun manufacturer for a defective product under a strict liability doctrine.
- Sue the stable for supplying a defectively bumpy-riding horse on a negligence theory.
- Sue the city for negligently landscaping the park and placing a rock on the spot where you fell.

You will become a limping millionaire. You will become a winner in the "U.S. tort law lottery system."

Killing small business

Two destructive economic shifts are occurring as a result of our tort law lottery system. The worst effect is the killing of small businesses. A number of years ago, there were 30 or more small manufacturers making football helmets. Product-liability lawsuits have driven most of them out of business. Today, there is only a handful.

There were more than 400 verdicts awarding $1 million or more in damages during 1984. Small businesses cannot afford adequate insurance to cover million-dollar lawsuits. Big businesses can. In one fell swoop, the U.S. kills small local businesses, while large overseas competitors take over the market.

The second tragic effect of our tort law lottery system in the U.S. is the withdrawal of useful products and services from the market.

One famous gynecologist stopped delivering babies because his obstetrics malpractice insurance cost $120,000 per year. He needed to deliver 200 babies a year just to meet his office expenses.

The U.S. has lost the services of one of its most highly trained medical experts. He cannot deliver babies in this

---

Martin is an attorney with the firm of Oltman and Flynn in Fort Lauderdale, Fla.

country because God has not made the procedure foolproof. We cannot repair the U.S.' tort law lottery system overnight. But we can zero in on helping the U.S. software industry rather painlessly. It is in the best interests of the U.S. to restrain governmental regulation in the computer services industry.

Make it a "service"

An ideal place to start is to define all of the computer services industry, including software creation, as a "service." This would protect vendors from lawsuits based on implied warranty or strict liability doctrines. That means that vendors cannot be sued unless they lied to customers or were negligent when they wrote the software.

Quite frankly, it is very possible that software is going to kill lots of people in the near future. Today, software malfunctions primarily foul up sales reports and ledger sheets. Tomorrow, industrial robotization will change all that.

As computers become more and more involved in daily physical processes such as in home security systems and farther away from simple number crunching, the danger of physical harm resulting directly from software error grows. Future software-based airline traffic control systems, medical electronics, robotic hazardous waste disposal systems and superhighway automotive guidance systems will malfunction and actually kill people.

> ***If I become a victim of a technology-based disaster such as faulty brakes, should I become a wheelchair millionaire, or should I receive free medical service and return to as productive a life as possible?***

Several of these futuristic systems are technologically feasible now. Massive legal reforms are needed, however, before they become economically feasible in the U.S.

Without such reforms, foreign nations will zoom past the U.S. in technological efficiency and available jobs. The U.S. is the only nation in the world that allows lawyers to share fees with accident victims. This nation must balance the benefits that automation provides to society against the inevitable personal tragedies that high-tech living entails.

Queen for a day

Today, no jury considers how many lives an ambulance has saved. It only considers the injuries caused by one failure of one tire on the ambulance's last run.

But technology has increased human life spans from 40 years in many developing nations to more than 70 years in high-tech nations such as the U.S. So if you're over 40, you already owe your life to entrepreneurial scientists who commercialized ambulances, penicillin, fertilizers and catalytic converters.

We have no natural right to disembowel our nation economically because the life support system it gave us eventually met fallible limitations implicit in all human inventions. *The Miami Herald* measured technology's price in a Jan. 30 article, "Harsh Lessons in Human Frailty," in this way:

"Like the *Titanic* sinking and the *Hindenburg* disaster, the shuttle explosion was a chilling reminder that technology — giver of longer life spans, miracle cures, wondrous machines of communication and travel, enchanting consumer products — is ultimately as flawed as its maker."

Yet every day, compassionate jurors play queen for a day and try to repair broken lives by awarding millions of dollars to accident victims and their lawyers. If small businesses in the U.S. are going to exist into the next century, limits are going to have to be set through federal legislation on all product liability and general liability awards.

Various other reforms — including the abolition of joint and several liability, courtroom delay tactics and mandatory self-insurance for personal injury — are all in the offing.

For now, this article proposes a very humble legal reform. Treat America's software as we do America's blood. Blood has been legally shielded from the national tort law lottery system by specific statutes in 44 states. If you sell whole blood, you cannot be sued unless you lie about what you are selling or unless you are negligent in its delivery. If the buyer of the blood dies from undetected serum hepatitis in the transfused blood, then the blood vendor cannot be sued.

God has not allowed man to guarantee that blood does not have deadly hidden impurities. Lawmakers have come to the proper conclusion that society is better off with impure blood than no blood at all. Clearly, this argument fits to a tee the U.S. software industry; after all, God has not allowed man to produce perfect software either. The U.S. is better off with imperfect software than with none at all.

The flowering software industry in the U.S. represents a great source of innovative technology. Today's personal computers streamline numerous sectors of our economy, contributing to the lives of students, engineers, secretaries, businessmen and lawyers. But continued success depends on the cottage industry of

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small software vendors. The growth of the personal computer hardware industry relies directly on the output of thousands of small software companies.

IBM responded to this challenge by breaking a major employee relations precedent. It created an incentive program whereby IBM employees could earn extra money by writing programs for IBM's Personal Computer. That one management decision broke the heretofore ironclad rule of "no moonlighting" for IBM employees. More significant, it unleashed more than 100,000 potential entrepreneurs into the software services industry.

But the imposition by the federal government of hidden Uniform Commercial Code (UCC) warranties onto this new activity can create additional legal and liability costs resulting in a slowdown in a vital industry. It is not healthy for the U.S. to perpetrate the fate of the football helmet manufacturers onto the software industry. Even the high growth rates anticipated for hardware cannot be achieved without an abundant supply of software.

Additionally, a key difference exists for our society between software and every other technological advancement. Software can be produced by anyone. The future offers more and more ease of programming. Thus, in a few years, Grandma may load her famous recipes onto diskettes and sell them through computer stores! All other high-technology products are becoming more complex and difficult to produce, engendering the pattern of mergers, acquisitions and giant manufacturing corporations. These giants can afford to insure for many of the injuries they create. Grandma cannot.

Forty-four of the 50 states modified the UCC to exclude donated blood from the implicit warranties that apply to other traded goods. Using the structure in Illinois Statutes, Title 91 Section 181, I propose a statute for limiting liability in the data processing services industry in a parallel way:

The availability of knowledge in the science of automation, skills, software and related services for the purpose of automating society through data processing is important to the health, welfare and economy of this nation's people. *The imposition of legal liability without fault* upon the persons and organizations engaged in such automation procedures inhibits the exercise of sound business judgment and restricts the availability of important automation knowledge, skills, services and materials.

It is therefore the public policy of this nation to promote the health and welfare of the people and the economy by limiting the legal liability arising out of such automation procedures to instances of negligence, willful misconduct, tortious misrepresentation or breach of express warranties.

Who should pay?

The major policy question for the courts and legislatures to answer is, Who should pay for America's computer learning curve — the customers (200 million people) or the data processing services industry?

Clear thought on this question can lead to only one conclusion. A small, entrepreneurial, high-technology service industry cannot afford to finance the U.S.' love for the computer.

Any effort to define services as "goods" in order to impose government-enforced hidden warranties can lead only to a slowdown in the rate of technological progress for the U.S. Only large corporations with high overhead expenses — and the high end-user prices that result — will enter the market, and they will be selective, restricting their activities to small, lucrative portions of the market. Thus, in large segments of the American economy, a shortage of cost-effective software will slow automation projects.

The free market, the combination of freedom to contract and ample common-law remedies can allow adequate end-user protection, while creating the environment for the U.S.' successful transition to an information society. For now, however, sound advice for computer service vendors is to use a form contract patterned after government-imposed hidden warranties.

Now you can vote. Plan for progress or continue the U.S. tort law lottery system? ■

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NEW PRODUCTS

ADR updates PC/Datacom report facility

Applied Data Research, Inc. (ADR) of Princeton, N.J., has announced Release 2 of ADR/PC Datacom, a personal computer-based query and report-writing facility.

PC Datacom is said to support the exchange of data between the IBM Personal Computer and the mainfame, as well as other personal computer functions.

Release 2 features personal computer-based query creation and host data download and upload, a full function report writer, data export and import for the exchange of data between personal computer spreadsheet and other applications software and a procedure facility for unattended and repetitive tasks.

The enhanced download function of PC Datacom is menu driven. The upload function permits users to transfer personal computer-created information to a mainframe ADR/Datacom/DB data base where it can be retrieved by other PC Datacom or mainframe ADR/Dataquery and Ideal users. It can also be used as a transaction file for updating production data.

The report writer supports sorting, column totals, control breaks, special selection criteria, key word substitution and arithmetic calculations. The data export function reformats downloaded data into formats including Comma Separated Value and Data Interchange Format

All of PC Datacom's interaction with ADR/Datacom/DB on the mainframe is performed under the control of ADR/Datadictionary and ADR/Dataquery. Data access can be controlled by table, field or field content value.

PC Datacom is shipped with ADR's PC Link communications software. It operates on any IBM Personal Computer, Personal Computer XT or AT using IBM PC-DOS 2 or higher.

The IBM 3270 Personal Computer is also supported.

PC Datacom requires ADR's mainframe Datacom/DB, Datadictionary and Dataquery.

PC Datacom costs $495 per copy.

Harris configurations debut

Design to manufacturing on one integrated system

Harris Corp. of Fort Lauderdale, Fla., has introduced three configurations of Harriscad, a fully integrated system for computer-aided design, drafting, engineering and manufacturing.

The configurations are said to enable users to go from design concept, analysis and drafting to manufacturing on one integrated system.

According to the vendor, each system includes the Harriscad design and drafting software, a compact Harris superminicomputer designed for the engineering office and peripherals.

The entry-level configuration, priced at $90,000, supports two users. It includes a Harris 60 computer with 1.5M bytes of memory, integrated floating-point processor, a 160M-byte disk drive and a cartridge tape drive.

The medium configuration, priced at $110,000, supports four or more users. It includes a Harris 60 computer with 3M bytes of memory, integrated floating-point processor, a 474M-byte disk drive and a streaming tape drive, according to the vendor.

The largest configuration, priced at $127,000, also supports four or more users. It includes a Harris 60 computer with 6M bytes of memory, integrated floating-point processor, 6K bytes of cache memory, a 474M-byte disk drive and a streaming tape drive.

Hardware options, such as additional memory and user terminals as well as software options, including numerical control and analysis, are available, the company said.

The Harriscad module for numerical control costs $10,000.

Metaphor Reporter uses icon interface to retrieve data

Metaphor Computer Systems, Inc. of Mountain View, Calif. has announced Reporter, a reporting tool that allows users to access data through an icon interface from the company's Metaphor information retrieval system.

Reporter allows users to retrieve and analyze information and to produce custom-tailored reports. It works with Metaphor, a special-purpose computer system that provides a customized view of mainframe data. The system operates in conjunction with IBM VM and MVS hosts.

Reporter is available now and can be added to existing Metaphor installations for $300 per workstation. The new price of the Query Tool Set, including Query and Reporter, is $1,000. A complete Metaphor Workstation Tool Set, including Reporter, Query, Applications Capsule, Basic, Spreadsheet, Plot and Text, costs $1,500.

Cosmic expert systems tool out

Cosmic, the National Aeronautics and Space Administration's Computer Software Management and Information Center of Athens, Ga., has announced the availability of Cerberus, a forward-chaining, knowledge-based system that is said to allow users to experiment with expert systems.

Reportedly, Cerberus can be used to develop and test expert systems such as a financial adviser or a decision analysis program. It also can be used as a teaching tool because it can trace and recount the rules used to reach a given conclusion.

Cosmic received Cerberus for distribution in December. Fortran 77 source code is available for $1,750, which, the vendor said, is basically its reproduction cost. It was written on a Digital Equipment Corp. VAX computer running VMS and will run on any VAX. Because the program is written in Fortran, it reportedly does not require any special hardware.

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SOFTWARE & SERVICES

Systems software

Interactive Solutions Corp. has released **Version 2.1** of its **Keygraf/3000**, a business graphics system for the Hewlett-Packard Co. HP 3000.

Keygraf is said to integrate graphics with analysis and data handling functions. Version 2.1 allows Keygraf charts to be incorporated into other software packages that use figure files. It also provides a direct interface to remote plotters connected to the HP 3000.

Version 2.1 costs $995 with limited support or $2,995 with extended support. Existing users may upgrade for $325.

Interactive Solutions, P.O. Box 354, Woodinville, Wash. 98072.

■

Softworks, Inc. has announced **VSAM Mechanic**, a program said to provide VSAM installations with facilities for repairing damaged VSAM/ICF catalogs and VSAM data sets.

VSAM Mechanic allows users to recover lost VSAM catalogs and data sets as well as repair damaged ones without down-leveling data. The vendor said this means increased system availability to meet batch production schedules.

VSAM Mechanic operates with all OS/MVS systems. A site license costs $9,950.

Softworks, 7700 Old Branch Ave., Clinton, Md. 20735.

■

Simware, Inc. has announced **Sim/Scope**, a software package for IBM mainframes running the VM/SP operating system.

Sim/Scope is said to be able to trace data flows on devices connected to a VM/SP system. It can trace I/O activity on telecommunications lines, disk packs, tape drives, 3270 terminals, control units and channels.

Sim/Scope is available for an annual lease price of $3,500 for a single CPU or $10,000 for a site license.

Simware, 14 Concourse Gate, Nepean, Ont., Canada K2E 7S6.

■

Data Translation, Inc. has announced **MicroVMSLIB**, a software package for Digital Equipment Corp.'s Microvax II said to allow high-speed data acquisition and control functions.

Features include continuous data transfer to disk at throughputs up to 50,000 sample/sec., on-line Help, automatic verification and support of three modes of data collection.

The initial license for MicroVMSLIB is $1,995.

Data Translation, 100 Locke Drive, Marlboro, Mass. 01752.

■

Bell & Howell Manufacturing Systems and Services has introduced **Power+**, a software package designed to enhance IBM Communications-Oriented Production Information and Control System operations.

Power+ is said to generate management reports and analyses necessary for manufacturing resource planning and cost control. There are two parts of Power+, the Standard Cost Accounting System and the Job Cost Accounting System.

The basic cost of Power+ is $29,000. Supplemental packages cost from $1,500 to $9,000.

Bell & Howell, 2231 Howard St., Evanston, Ill. 60202.

Global Software, Inc. has added modeling capabilities to its **Hospital Cost Control System (HCCS)**, a cost accounting package for health care institutions.

Modeling techniques are said to allow administrators to project the effects of scenarios on treatment patterns and procedure volumes.

HCCS runs on IBM 4300, 3000 and plug compatibles plus System/34, 36 and 38.

A basic system costs about $250,000 operating in a DOS mainframe environment.

Global Software, 1009 Spring Forest Road, Raleigh, N.C. 27609.

■

On-Line Software International, Inc. has released **Verify Version 2**, an enhancement of its CICS testing control system.

Verify is said to automate regression testing for CICS applications by logging data transmissions and simulating

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It would pay you to mark it on your calendar.

Because today is the day we introduce our new Pinwriter™ P5XL dot matrix printer. The only dot matrix printer available capable of producing the crisp, black printing you associate with a letter-quality printer. Because it's the only one designed to use not just a fabric ribbon, but a letter-quality multistrike film ribbon—the same ribbon used in typewriters and letter-quality printers.

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operator input. Enhancements include all unequal row mismatch display, test stream editing, batch run and compare and volume testing support. Other features include automated variable fields for mismatch processing, terminal selection and sign-on/sign-off options.

A single CPU license costs $35,000.

On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Applications packages

Target Systems Corp. has announced **Version 4** of **Target Cal**, a calendar management package for Digital Equipment Corp. VAX computers running VMS.

Target Cal allows VAX users to maintain lists of daily appointments and meetings. Entries can be added, changed, purged or deleted. Hard-copy listings are supported, and users are notified of current appointments when they log on.

Target Cal costs $395.

Target Systems, 33 Boston Post Road W., Marlboro, Mass. 01752.

■

Eesof, Inc. has announced **Touchstone Sr.**, a computer-aided engineering program for microwave engineers.

Touchstone Sr. allows users to create customized element models and offers the ability to store them in a circuit model library. The program includes software documentation, libraries of standard models and templates. It also comes with Eemail, the firm's electronic mail service.

Touchstone Sr. is available for the Hewlett-Packard Co. 200 computer, the HP Vectra and the IBM Personal Computer line.

It costs $3,000.

Eesof, Suite 205, 31194 La Baya Drive, Westlake Village, Calif. 91362.

Abacus Systems, Inc. has announced **Tracker/3000**, a labor tracking system for the Hewlett-Packard Co. HP 3000, and has ported its **Marketing Management System** to the HP 150.

Tracker/3000 allows businesses to manage time and billing charges from staff engaged in project activities. It can be used stand-alone or with Abacus' Usage/3000 computer resources accounting system.

Marketing Management System 150 offers prospect tracking, telemarketing, direct mail, sales forecasting and advertising analysis.

Tracker/3000 costs $1,350 or, with Usage/3000, $2,600. Marketing Management System 150 costs $795.

Abacus Systems, 832 Sansome St., San Francisco, Calif. 94111.

Languages

Silogic, Inc. has announced **The Knowledge Workbench**, a modular applications development environment for building expert systems, knowledge bases and expert data bases.

The Knowledge Workbench consists of a natural language processor, an expert system shell with inexact reasoning and an enhanced Prolog environment. It runs on Motorola, Inc. 68000 Unix super microcomputers and features a data base interface said to allow the applications developer to build knowledge-based systems on top of existing data from relational data base management systems.

The complete system costs $21,000.

Silogic, Suite 600, 9841 Airport Blvd., Los Angeles, Calif. 90045.

■

Whitesmiths, Ltd. has announced a **C compiler** for the IBM System/36.

The compiler includes a library for interfacing to the SSP operating system. It runs on an IBM Personal Computer under Microsoft Corp. MS-DOS and produces standard assembler code that is downloaded to the System/36. Assembly and linkage editing are performed on the System/36 using the IBM assembler and Overlay Linkage Editor.

The compiler is supplied in binary form. It costs $15,000 for a single CPU.

Whitesmiths, 97 Lowell Road, Concord, Mass. 01742.

■

Convex Computer Corp. has announced **Vector C**, a vectorizing C language compiler developed for the vendor's C-1 supercomputer.

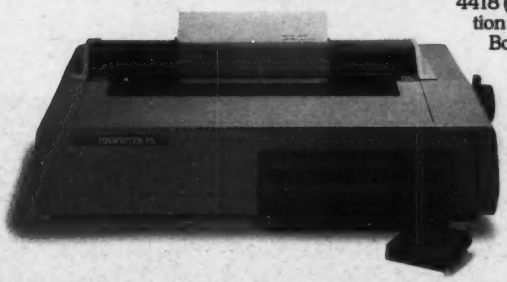
Vectorization is said to improve performance by automatically replacing a series

Continued on page 73

BLACKEST DAY
PRINTER HISTORY.

Now for all the exclusive features we managed to pack into the Pinwriter P5XL, you'll find it only costs about the same as other top 24-pin dot matrix printers.

The Pinwriter P5XL printer is the newest addition to the only 24-pin printer line that has a model designed to fit every need and budget. See them at your dealer or for more information call 1-800-343-4418 (in MA 617-264-8635). Or write: NEC Information Systems, Dept. 1610, 1414 Massachusetts Ave., Boxborough, MA 01719.



NEC PRINTERS. THEY ONLY STOP WHEN YOU WANT THEM TO.

NEC
NEC Information Systems, Inc.

ONE THING VT200 IMITATORS CAN'T BEGIN TO IMITATE.

In a world full of imitators, it's an easy mistake to assume that any terminal that looks like a VT200™ will perform like a VT200. After all it's no major task to imitate the most superficial features of a video display terminal.

But there's one test of a video terminal that simply can't be judged in a 15 minute demonstration.

The toughest test of all. The test of time.

While other display terminals were designed to impress you in the showroom, Digital's VT200 series was designed to make a more lasting impression. To keep you comfortably productive years down the road.

That's what inevitably separates an industry standard from the rest.

And why so many professionals return time and time again to products with the Digital logo.

THE DIGITAL LOGO MEANS LONG TERM PRODUCTIVITY.

It's no coincidence that the VT200 family was designed by engineers who, like end users, sit in front of display terminals day in and day out. They've discovered the shortcomings, the idiosyncrasies and all the subtle little problems that can end up robbing you of productivity.

As a result, some of the VT200's best features are ergonomic. The angle of the screen. The sculpture of each key. The design of the keypad.

These are the things that become most apparent after hours of prolonged use. And often spell the difference between a terminal that's a genuine productivity tool and one that's – quite literally – a pain in the neck.

The fact is, the VT200's ergonomic design and the resulting ease of use were two of the reasons it won the International Design Award, in both 1983 and 1984.

THE DIGITAL LOGO MEANS LONG TERM COMPATIBILITY.

Whether you're looking for a terminal for your VAX.™ DECsystem or PDP-11™ based system, the VT200 has a rather obvious advantage over any other terminal you might consider.

We built the host. As well as the other peripherals you'll be using.

So it only makes sense that our video terminals are substantially more compatible up and down the Digital family line. Each new generation, for example, brings with it all the important elements from previous generations. Which is why you'll find some of our customers using 10 year-old VT52™ terminals with brand new VAX systems. The simple fact is, Digital has always been committed to protecting your investment with every move you make.

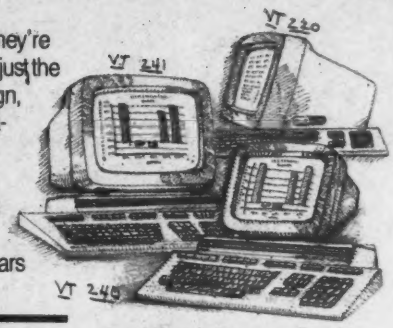
In addition, our breadth of product line means Digital can provide you with a total solution. Hardware, software and peripherals. And while single sourcing is not an end in itself, it certainly provides an extraordinary measure of convenience, compatibility and reliability. Particularly when the single source is Digital.

THE DIGITAL LOGO MEANS LONG TERM RELIABILITY AND SUPPORT.

When asked to single out the strongest feature of Digital's video terminals, many users point to the most visible asset of all. Durability.

Over the years, we've heard some pretty gruesome stories about the ordeal our terminals have endured. Like coffee that was spilled on keyboards. Or cables that were inadvertently ripped from their ports. They've even survived trial by fire. While it's unreasonable to expect even the toughest video display to come through every major trauma unscathed, it's comforting to know your terminal has a reputation for survival.

It's equally comforting to know you've got a support team behind you every step of the way. A support team rated the best in the business by users.* They're there for everything. Not just the repairs, but system design, training, updates, education and seminars. All to make sure you get the absolute maximum from your video terminals. Today, tomorrow, and years down the road.



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For a detailed brochure or more information, as well as the name of the Authorized Terminals Distributor or Digital Representative near you, write Digital Equipment Corporation, 129 Parker Street, Maynard, MA 01754.

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Silver Quadboard®	SixPakPlus™
☑ **Reliability:** Advanced 256K technology combines with 64K technology for greater reliability.	☐ **Reliability:** Limited to 64K technology.
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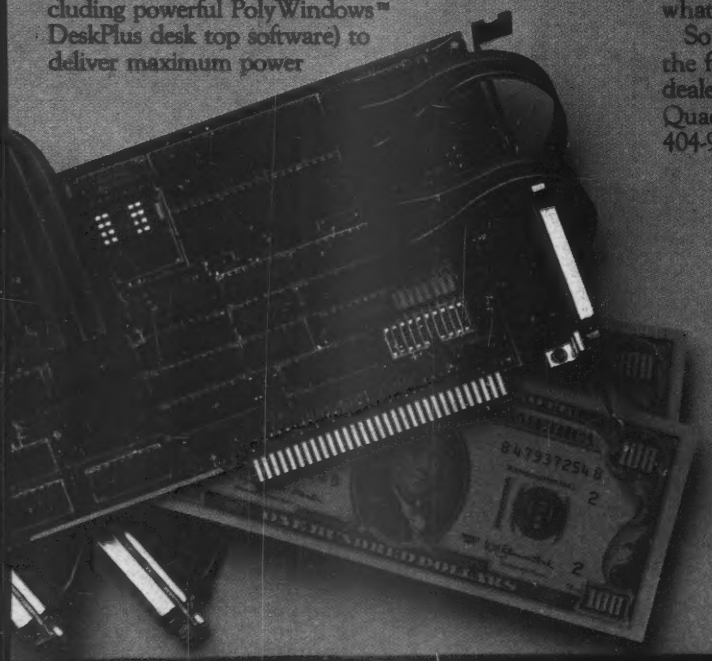
☑ **Warranty:** 5 year extended warranty with 384K (factory installed).	☐ **Warranty:** 2 year warranty.
☑ **Compatibility:** 100% PC compatible.	☑ **Compatibility:** 100% PC compatible.
☑ **Software:** RAM Drives, spooler and productivity software.	☑ **Software:** RAM Drives, spooler and productivity software.
☑ **Price:** Hundreds of dollars less than you would expect to pay.	☐ **Price:** Hundreds of dollars more than you should pay.

The [illegible] Check the facts. You'll see why Silver Quadboard outperforms the competition everytime. Only Silver Quadboard combines so many standard features (including powerful PolyWindows™ DeskPlus desk top software) to deliver maximum power [illegible] compatible system. And, with its advanced-technology design, Silver Quadboard does it better than any other board on the market, for hundreds of dollars less than what you'd expect to pay.

So before you buy a new multifunction board, check the facts yourself. Then check with your local Quadram dealer for a free demonstration. Or contact us at One Quad Way, Norcross, Georgia 30093-2919; 404-923-6666.



SPECIFICATIONS:
Silver Quadboard: Memory expansion in 64K or 256K increments, two serial ports, parallel port, game port, clock/calendar, QuadMaster III with RAM drive and spooler software, PolyWindows DeskPlus software.

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QUADRAM®
An Intelligent Systems Company

Continued from page 69

of machine language instructions with fewer, more powerful vector instructions. According to the vendor, Vector C analyzes programs for opportunities to apply vector instructions.

Vector C is priced at $20,000.

Convex Computer, 701 N. Plano Road, Richardson, Texas 75081.

Utilities

Aldon Computer Group has ported its **S/Compare** source comparison utility to the IBM System/38.

S/Compare is said to find differences between two source files and display them on a report.

S/Compare costs $2,100. After 120 days there is a yearly maintenance fee of $300.

Aldon Computer Group, 405 14th St., Oakland, Calif. 94612.

■

Sterling Software Marketing Co. has released its **Comparex Version 6** comparison utility.

Comparex 6 is said to provide the ability to compare the contents of any two files of similar or differing formats and structures.

Comparex costs $9,500 for MVS versions and $5,000 for DOS/VSE and VM/CMS versions.

Sterling Software Marketing, Suite 100, 11050 White Rock Road, Rancho Cordova, Calif. 95670.

■

Pansophic Systems, Inc. has released **Gener/OL 5**, an enhanced version of its interactive on-line program development and query system designed for use under CICS.

The base system consists of a number of editor/compilers.

Gener/OL costs $49,000 for OS and $35,000 for DOS versions.

Pansophic Systems, 709 Enterprise Drive, Oak Brook, Ill. 60521.

■

Volz Associates, Inc. has announced **T'Equate**, a magnetic tape-based file management system for the Hewlett-Packard Co. HP3000, and **Harmony**, an HP3000 system management support service.

T'Equate provides a set of functions said to automate aspects of the management of magnetic tape resident files and file sets.

The Harmony service provides periodic system performance reviews consisting of analysis of software and hardware installation plans, applications design, applications performance and configuration analysis.

T'Equate costs $3,500. Harmony is priced from $1,500.

Volz Associates, 34 Undine Ave., Winthrop, Mass. 02152.

■

Jyacc, Inc. has announced **Version 2** of its **Jyacc Formaker** screen and window manager.

Jyacc Formaker consists of a utility for creating and maintaining forms and windows and a subrouting library providing access to them. Version 2 enhancements include Help windows on a field or form basis, automatic creation of C structures for saving the contents of the form, optional graphic borders, multiple range checks, date and time formatting, data calculations and check-digit calculations.

Jyacc Formaker runs under Unix, Prime Computer, Inc. Primos and Microsoft Corp. MS-DOS and Xenix operating systems.

Prices range from $650 to $3,000.

Jyacc, 919 Third Ave., New York, N.Y. 10022.

■

Oasys, a division of XEL, Inc. has announced the **Oasys 68020 Toolkit**, a set of Motorola, Inc. MC68020 software development tools.

The tool kit features a line of compilers, assemblers, debuggers, simulators, profilers, real-time OS and down-line load utilities. Support for the Motorola 68881 floating-point processor is also provided.

The tool kit is available on Digital Equipment Corp. VAX and Microvax systems and Sun Microsystems, Inc., Apollo Computer, Inc. and other systems running Unix.

A typical configuration starts at $3,200.

Oasys, 60 Aberdeen Ave., Cambridge, Mass. 02138.

■

Wild Hare Computer Systems, Inc. has released an enhanced version of its **Choice** software.

Choice reportedly runs programs written in Data General Corp.'s Interactive Cobol language on non-DG computers.

No conversions, translations or recompilations are required, according to the vendor.

Compatibility is maintained because the same program and data files from the DG computers are used on the target machines.

Prices range from $499.95 for Microsoft Corp. MS-DOS software to $9,725 for Digital Equipment Corp. VAX systems.

Wild Hare Computer Systems, P.O. Box 3581, Boulder, Colo. 80307.

Training software

Sterling Software Marketing Co.'s Dylakor Division has announced **CBT Level 2, The Intermediate Guide**, a software program designed to instruct users of its DYL-280 and DYL-280 II information management systems.

CBT Level 2 is intended for moderately experienced users. Points covered include using control breaks and summary processing, key informa-

Continued on page 74

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CHARLES RIVER DATA SYSTEMS

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Continued from page 73

tion processing, sorting variations, multiple report combinations and formatting and printing variations.

The program runs on Microsoft Corp. MS-DOS or IBM PC-DOS computers with IBM Personal Computer-compatible color or monochrome graphics boards. It costs $1,000, or $800 for owners of CBT Level 1.

Dylakor, P.O. Box 3010, 17418 Chatsworth St., Granada Hills, Calif. 91344.

Services

Associated Technology Corp. has introduced a four-volume **programming documentation guide** for Cobol, Fortran, Basic and Dbase languages.

The set was designed to serve as a software management tool for establishing a firm's internal programming and documentation practices.

The set costs $47.50.

Associated Technology Books, Box 475, Rt. 2, Estill Springs, Tenn. 37330.

■

Dataline Corp. has introduced a **computer security personal client retainer service** designed to meet the needs of small business people and individual managers.

The offering provides ongoing services including an educational protection package, security awareness material, customized risk evaluation, a 24-hour hot line, access to seminars and products, individual consultation and confidentiality in all aspects.

There is a $40 yearly retainer fee for the service. Optional services, such as group training, staff evaluation and microcomputer assistance, are available for an added charge.

Dataline, P.O. Box 15221, Minneapolis, Minn. 55415.

■

Patricia Seybold's Office Computing Group has announced **Patty Seybold's Network Monitor**, a research service covering local-area networks.

The service comprises a monthly newsletter and two market research reports. The vendor said each month the "Network Monitor" will present analyses of products and strategies designed to enable users to make better informed buying decisions.

The newsletter is available for $495 per year. The full service costs $1,995.

Office Computing Group, Suite 612, 148 State St., Boston, Mass. 02109.

■

Multipath, Inc. is offering a catalog listing library of public domain Microsoft Corp. MS-DOS, IBM PC-DOS, Digital Research, Inc. CP/M 80 and CP/M 86 software on 3½-, 5¼- and 8-in. floppy disks.

Categories include Unix utilities, programmers' tools, word processors, data base managers, telecommunications programs and terminal emulators. Packages listed include accounting programs.

All software is updated from nationwide bulletin boards.

The catalog describes each program and lists public domain software bulletin boards. It costs $5.

Multipath, P.O. Box 395, Montville, N.J. 07045.

MICROS

Systems

Compucorp has introduced the **Connection**, a workstation said to run Microsoft Corp. Xenix and MS-DOS concurrently.

The Connection comes in both 16- and 32-bit configurations. The Connection 32 includes 1.64M bytes of random-access memory (RAM), a 20M-byte Winchester disk drive, a 360K-byte floppy drive and 16M bytes of virtual RAM. The Connection 16 includes two floppy drives and 640K bytes of RAM.

Prices range from $2,995 to $4,995.

Compucorp, Suite 306, 1460 4th St., Santa Monica, Calif. 90401.

IBM ASCII terminals:

The case in black and white.

Introducing a somewhat more colorful member of the family.

Meet the IBM 3164 ASCII Color Display Station.

It gives you eight foreground and eight background colors. On a 14" screen.

And because of its 8 x 16 character matrix, the 3164 gives you clear, crisp characters in color.

But is color any reason to buy IBM's 3164? It is, according to studies that indicate the use of color increases productivity, decreases errors and promotes user satisfaction.

Color, of course, is far from the sole reason for choosing the 3164. To appreciate the others, you should get to know the rest of our ASCII family.

Emulation. Another side of the family.

Our ASCII terminals are designed to fit into existing systems. Even if the systems aren't ours.

Emulation Capability	
3161	IBM 3101 Model 881 ADDS Viewpoint* Hazeltine 1500* Lear Siegler ADM-3A* Lear Siegler ADM-5* TeleVideo 910*
3163	IBM 3101 Model 881 DEC VT 52* DEC VT 100* TeleVideo 950*
3164	IBM 3101 Model 881

For example, our basic ASCII Display Station, the IBM 3161, emulates up to six terminals. And the advanced-function 3163 emulates a number of higher level ASCII data streams.

Features	3161	3163	3164
Screen size	12"	12"	14"
Lines x characters	25x80	25x80	25x80
Character matrix	8x16	8x16	8x16
Double-sized characters	No	Yes	Yes
Line drawing characters	24	24	24
Vertical scroll	Jump	Jump/ Smooth	Jump/ Smooth
Definable function keys	24	24	24
Windowing	No	Yes	Yes
Partitioning	Horiz.	Vert./ Horiz.	Vert./ Horiz.
Characters in buffer	1920	7680	7680

What's more, every one of our ASCII terminals can operate in its own function-rich native mode.

Our family is flexible.

Our unique plug-in cartridges allow for considerable flexibility in your operation. For example, simply by switching cartridges you can shift a terminal from one data stream to another.

And, in many countries cartridges are also available that go beyond emulation to let you operate your ASCII terminals in several foreign languages. Appropriate foreign language keyboards are also offered.

Enhanced ergonomics. Another family trait.

All our ASCII terminal keyboards have 102 keys. But that's not all they have in common. Every keyboard also has a low profile, gentle contour and typewriter touch.

And our keyboards have programmable function and editing keys so they can be custom-tailored to fit your application needs. The 3163 and 3164 models also have redefinable and recappable keys.

Superior ergonomic design isn't confined to the keyboard, however. All three displays tilt and swivel for maximum user satisfaction. And, of course, by making the display easy to read, we made it easier on the eyes. In addition to the 8 x 16 character matrix, we gave it an advanced non-glare etched screen, cursors, and character and field attributes like blink, reverse video, underscoring and dual intensity.

High standards. Competitive prices.

Quantity discounts are offered, too. And financing is available through the IBM Credit Corporation. Best of all, each terminal comes with the quality, service and support you'd expect from IBM.

Contact your IBM marketing representative, or call 1 800 IBM-2468, Ext. KC/90, for the IBM Authorized Distributor nearest you. And we'll present more evidence in the case for IBM's ASCII terminals.

It may be all you need to color your view.

*ADDS Viewpoint is a trademark of Applied Digital Data Systems, Inc.; Hazeltine 1500 is a trademark of Hazeltine Corp.; Lear Siegler ADM-3A/ADM-5 are trademarks of Lear Siegler, Inc.; TeleVideo 910/950 are trademarks of TeleVideo Systems, Inc.; DEC VT 52/VT 100 are trademarks of Digital Equipment Corporation.

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Building E, Suite 304
Glen Ellyn, IL 60137
(312) 790-5040

NEW PRODUCTS/MICROCOMPUTERS

Sintec Co. has announced an **IBM Personal Computer XT-compatible computer**.

Features include 256K bytes of random-access memory, eight full expansion slots, 135W power supply, floppy disk controller board accommodating up to four drives, full-function keyboard, 360K-byte floppy disk drive, monochrome monitor and a monochrome graphics card with printer port.

The complete system costs $999.

Sintec, Box 410, 28 Eighth St., Frenchtown, N.J. 08825.

Software applications packages

G. O. Graphics has introduced **Deskset**, desktop publishing software for users of Apple Computer, Inc. Laserwriter and IBM Personal Computers.

Deskset provides intercharacter fit, automatic white space reduction in larger type sizes, accurate hyphenation with industry-specific exception word dictionaries and full size and style mixing. Other features include interactive input showing line-ending justification, batch input and justification from other ASCII word processing files and multicolumn setting.

Deskset software costs $995. A system including Deskset, IBM Personal Computer and Apple Laserwriter costs $9,495.

G. O. Graphics, 18 Ray Ave., Burlington, Mass. 01803.

■

Cricket Software has announced **Cricket Graph**, a color presentation graphics and page layout package for the Apple Computer, Inc. Macintosh.

Cricket Graph offers scatter, line, area, bar, column, pie, stacked bar, stacked column, polar, quality control, double-Y and text graph and chart types. It allows for plotting of more than 2,000 point/series. Data can be entered in rows and columns or imported from text-only files or from certain other applications programs.

The program offers data manipulation and multiple graph page layout. Cricket Graph costs $195. Versions for film recorders and color printers cost $495.

Cricket Software, Suite 206, 3508 Market St., Philadelphia, Pa. 19104.

■

Pyramid Data, Ltd. has introduced **Paragon — Client Accounting**, software said to provide client accounting capabilities as well as accounts payable, accounts receivable, payroll and inventory functions.

The program is used in conjunction with the vendor's Paragon — Accounting for Everyone. It operates on the IBM Personal Computer, Personal Computer XT or AT and requires 256K bytes of memory and a 10M-byte hard disk. Features include an after-the-fact payroll entry screen, custom financial statements and an unlimited number of accounts.

Paragon — Client Accounting costs $49.95. Paragon — Accounting for Everyone costs $995.

Pyramid Data, P.O. Box 10116, Santa Ana, Calif. 92711.

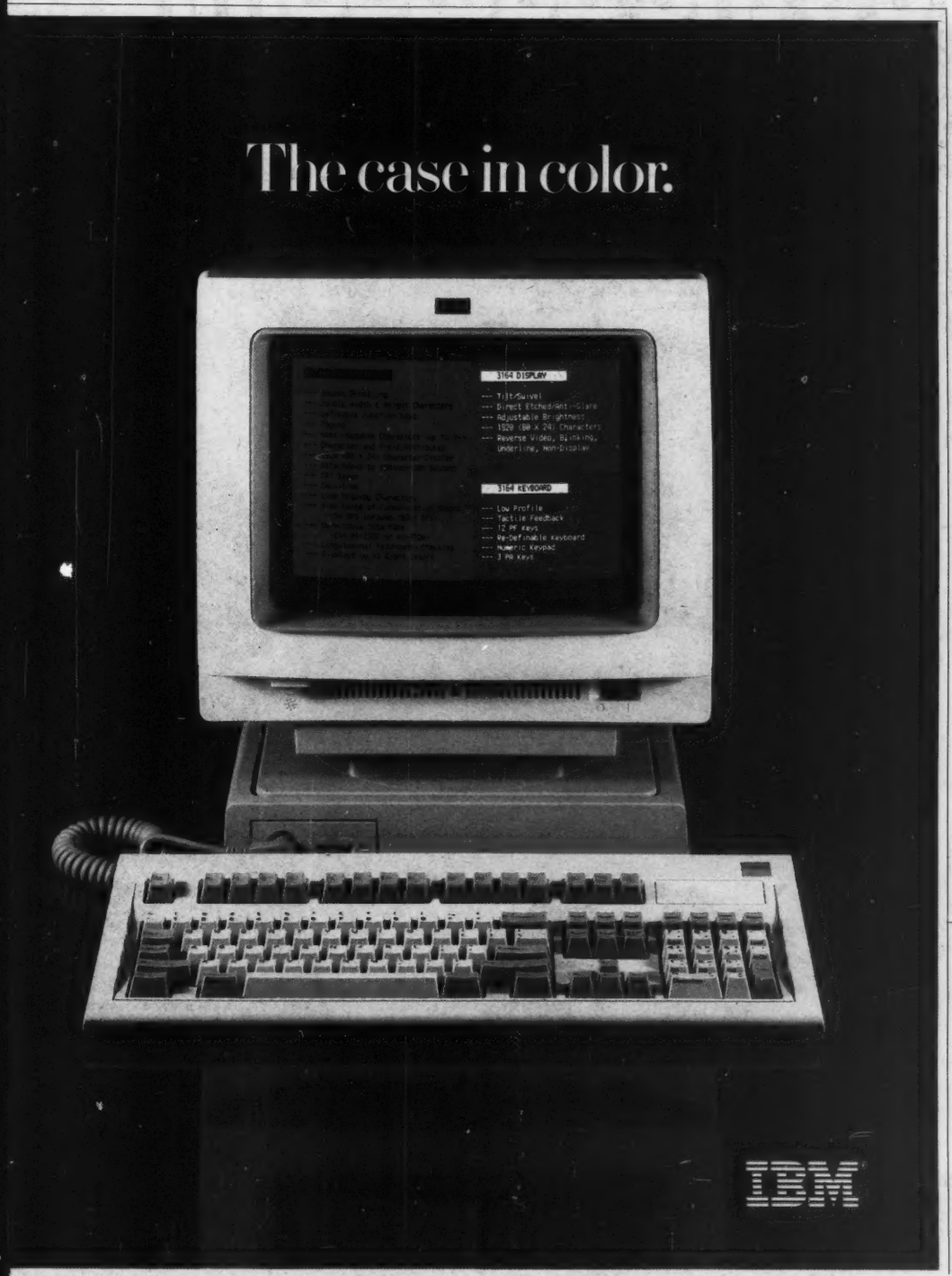
■

Indian Ridge Enterprises, Inc. has added a set of **general accounting applications** to its line of application packages for IBM microcomputers.

The applications include general ledger, accounts receivable, accounts payable, payroll, inventory and order entry. The packages are fully integrated but can also run stand-alone. They provide auditing records, documenting all transactions plus reporting options.

The packages cost $29.95 each.

Indian Ridge Enterprises, 508 2nd St., Oakland, Calif. 94607.



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Software languages

Bytel Corp. has announced **Genifer**, an applications generator for Ashton-Tate's Dbase III relational data base management system.

Genifer allows programmers to create business applications in the Dbase III language. It allows developers to create screens, menus and reports interactively. Features include a data dictionary, a screen editor and a report-generation facility.

Genifer costs $395.

Bytel, 1029 Solano Ave., Berkeley, Calif. 94706.

■

Dynabase Software Systems Ltd. has introduced **Transactional Systems Manager** (TSM), an applications generator designed for use on an IBM Personal Computer with IBM PC-DOS or Microsoft Corp. MS-DOS 2 or higher.

TSM consists of a runtime module, a tool kit for configuration, setting terminal codes, file markers, passwords, a word processor with box-drawing abilities and a design editor.

TSM uses windowing, Help and special editors so that applications are defined, not designed. No code is ever created, the vendor said.

TSM costs $49.95.

Dynabase Software Systems, 51 Tannery St., Mississauga, Ont., Canada L5M 1V3.

■

Production Systems Technologies, Inc. has announced that **OPS83**, the expert systems programming language, is now available for use on the IBM Personal Computer and compatibles.

The personal computer version, designed for developing and delivering practical systems, is said to be identical to the original version. It is written in C and the small code size gives users access to more memory. It also interfaces with other languages.

OPS83 costs $1,950 for each personal computer license.

Production Systems Technologies, 642 Gettysburg St., Pittsburgh, Pa. 15206.

Software utilities

System Automation Software, Inc. has announced **Release 2** of its **Logger** computer resource monitor.

Logger is a random-access memory resident program that tracks and documents the use of IBM Personal Computers, Personal Computer XTs and ATs. Release 2 offers login security and a summary option in the reporting subsystem that summarizes computer usage by user, directory and program.

Logger is priced at $74.95. Owners of Logger 1 can upgrade for $20.

System Automation Software, 8555 Sixteenth St., Silver Spring, Md. 20910.

■

Computerific, Inc. has introduced **Laserific**, a memory-resident software interface for the Hewlett-Packard Co. Laserjet printer and the IBM Personal Computer.

Laserific is said to enable users to access all the features of the Laserjet printer without interfering with the features of the software application program in use. It supports Xon/Xoff and RTS/DTR protocol and can be used with any parallel or serial port. It offers IBM Displaywrite 3 support and a printer spooler called Jetspool.

Laserific costs $149. With Displaywrite 3 support it costs $199. Jetspool costs $19.95.

Computerific, Suite 1008, 1201 Broadway, New York, N.Y. 10001.

■

Springboard Software, Inc. has announced **Clip Art Collection Volume 2**, a collection of business illustrations for use with its software program, The Newsroom.

The collection features a library of over 800 illustrations designed for creating business- and office-oriented publications with The Newsroom.

The program can be used in conjunction with The Newsroom's original art or any art from Clip Art Collection Volume 1. It runs on the IBM Personal Computer, Apple Computer, Inc. Apple II and Commodore Business Machines, Inc. computers. It is priced at $39.95.

Springboard Software, 7808 Creekridge Circle, Minneapolis, Minn. 55435.

■

Indigo Software Ltd. has unveiled **Iprint**, a forms and graphics generation program for laser printers.

Iprint is said to allow the use of an IBM Personal Computer to draw forms and graphics interactively on the screen using a mouse or a cursor and function keys and to save the results as an elecronic form.

Iprint supports printers from Hewlett-Packard Co., Canon, Inc., IBM and NCR Corp. It costs $259.

Indigo Software, 1568 Carling Ave., Ottawa, Ont., Canada K1Z 7M5.

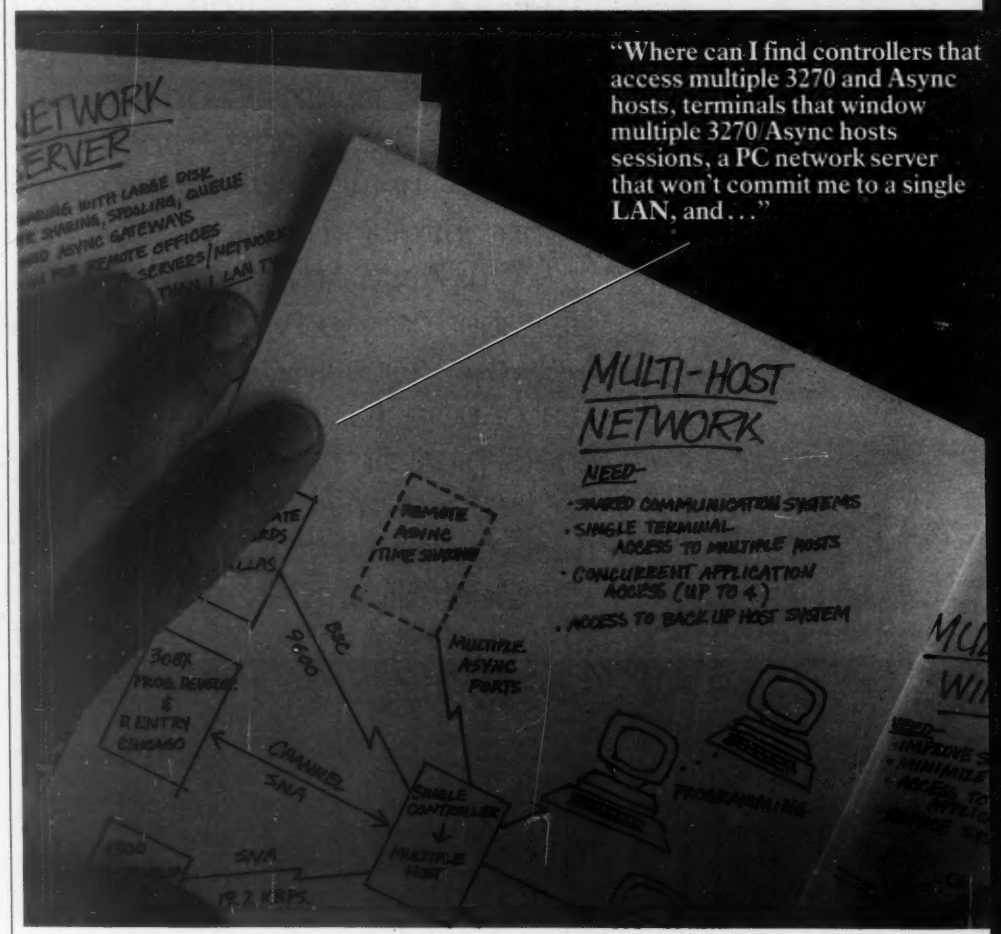
■

Guaranteed Software has announced **Arkive**, a storage management utility for hard-disk personal computer users.

Arkive is a memory-resident automated file tracking and archival program. Files can be located based upon criteria such as subject matter, creating program or dates. It offers a clean-up mode that identifies files that are obsolete or not needed. Arkive also supports file versions.

The Arkive package costs $79.95 plus $5 for shipping.

Guaranteed Software, 10044 South DeAnza Blvd., Cupertino, Calif. 95014.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• SHARED COMMUNICATION SYSTEMS
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• CONCURRENT APPLICATION ACCESS (UP TO 4)
• ACCESS TO BACK UP HOST SYSTEM
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As you search for new solutions, the new Lee Data Passport could be the best traveling companion you've ever had.

In it, you'll find a new generation of Lee Data Network and local processing solutions for 3270, Async, and PC environments.

Solutions that get information across corporate, workgroup, and personal computing borders so smoothly, your entire network can finally function as a single system.

Just as important, each solution is designed to help you keep your costs in line.

For example, one Lee Data controller can support multiple Async hosts, plus up to four on-line 3270 hosts. Local or remote. In any combination.

The Lee Data Open Window™ display can replace four ordinary terminals by windowing up to four concurrent 3270 and Async host sessions. Without a PC.

Lee Data's new LANMASTER™ PC network server allows multiple LANs to share files and peripherals,

NEW PRODUCTS/MICROCOMPUTERS

The **Persyst Division** of **Emulex Corp.** has announced the **Xenix driver** software package for its DCP-88 intelligent communications board designed for IBM Personal Computer AT-based multiuser systems.

It is said to be fully compatible with Microsoft Corp.'s Xenix System 5. Along with an Intel Corp. 8088-based, multiport DCP-88 communications card, it can support four industry-standard asynchronous terminals at 9.6K bit/sec.

The Xenix driver costs $150.

Emulex, P.O. Box 6725, 3545 Harbor Blvd., Costa Mesa, Calif. 92626.

Software enhancements

Softcraft, Inc. has released **Btrieve 4** and **Btrieve/N 4**, enhanced versions of its file management software for the IBM Personal Computer, Personal Computer AT and compatibles.

Features include variable-length records, data encryption, password protection and a file-level verify option. Btrieve/N 4, for multiuser and local-area network systems, is now available for any local net that supports the Microsoft Corp. MS-DOS 3.1 file-sharing function.

Btrieve 4 and Btrieve/N 4 cost $245 and $595, respectively.

Softcraft, P.O. Box 9802, #917, Austin, Texas 78766.

Communications

Computer Mail Services, Inc. has announced **Mailplus**, a software product said to allow MCI Communications Corp. MCI Mail subscribers to enter and exit the system with only two keystrokes.

Mailplus is said to provide built-in security to prevent unauthorized use of an MCI Mail account. It also enables MCI Mail customers to personalize form letters and verify ZIP codes. It remains on-line only as long as required.

Mailplus requires an IBM Personal Computer with 256K bytes of memory, a communications port and a modem. It costs $95.

Computer Mail Services, 17200 W. Ten Mile Road, Southfield, Mich. 48075.

■

Graftel, Inc. has introduced the **VP 220 Buffered Multiplexer**, said to enable up to four personal computers or terminals to share one or two printers or plotters.

The unit automatically stores print requests in its buffer memory and schedules printing output dynamically without operator intervention. Multiple units can be linked together to serve additional users.

The VP 220 Buffered Multiplexer costs $1,595 for a 256K-byte version and $1,995 for a 512K-byte version.

Graftel, 400 Executive Blvd., Elmsford, N.Y. 10523.

■

Quadram Corp. has launched its **Mainlink** line of micro-to-mainframe communications products.

The line is made up of four half-card-size expansion boards said to permit IBM Personal Computers, Personal Computer XTs or ATs to emulate IBM 3278 and 3279 terminals.

The Mainlink Standard coaxial connection and the Mainlink Plus coaxial connection link directly to an IBM 3274 or 3276 cluster controller. The remote versions attach via synchronous modem to an IBM 3705 or 3725 in IBM's Systems Network Architecture/Synchronous Data Link Control mode.

Prices for the Mainlink Standard coaxial, the Mainlink Plus coaxial, the Mainlink Standard remote and the Mainlink Plus remote are $895, $1,145, $545 and $985, respectively.

Quadram, One Meca Way, Norcross, Ga. 30093.

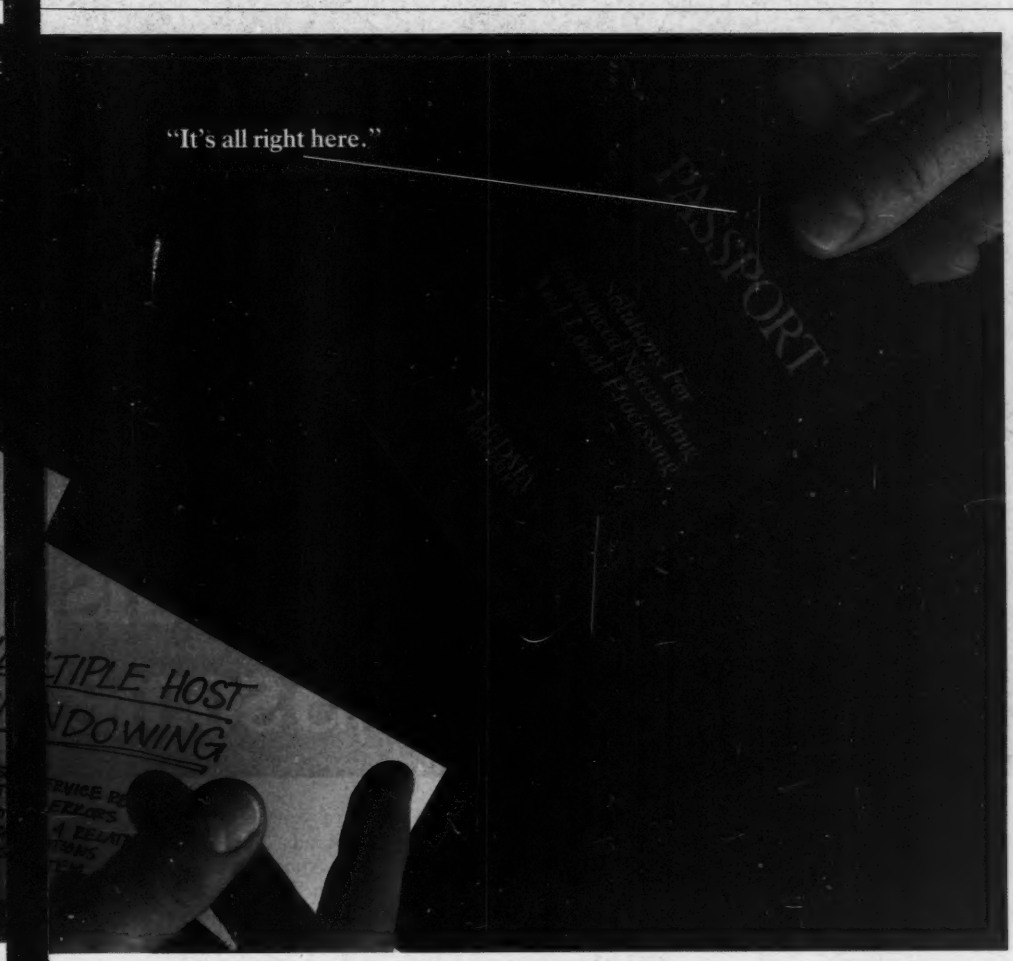
■

Dialog Information Services, Inc. has announced **Dialoglink**, a software system designed to enhance the use of the vendor's Dialog Knowledge Index and Dialmail on-line services.

Dialoglink consists of two modules: the Communications Manager, offering one-step logon to each on-line service, and the Account Manager, providing accounting information, including user-supplied charge codes for sessions with the Dialog services.

Dialoglink operates on IBM Personal Computers, Personal Computer XTs, ATs and compatibles. The pack-

Continued on page 82



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while simultaneously sharing communications gateways to multiple 3270 SNA and Async hosts.

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Tough Tech.
The power to get things done.

Continued from page 79

age costs $125. The Communications Manager alone costs $95, and the Account Manager alone costs $45.

Dialog, 3460 Hillview Ave., Palo Alto, Calif. 94304.

Data storage

Hewlett-Packard Co. has announced a 3½-in., 20M-byte Winchester **internal hard-disk subsystem** for the HP Vectra personal computer as well as a price reduction for the 40M-byte **hard-disk subsystem** and an **unbundling of data storage components.**

The drive mechanisms, ST506 controllers, mounting brackets and cables can now be purchased as separate products, company spokesmen reported.

Prices are as follows: hard-disk controller kit, $635; hard-disk mounting brackets, $120; disk-to-controller cables, $150; and ST506 hard-disk controller card, $490.

The internal hard-disk subsystems cost $1,625 for 20M bytes and $2,395 for 40M bytes.

HP, 1820 Embarcadero Road, Palo Alto, Calif. 94303.

Printers/plotters/peripherals

Electrohome Ltd. has introduced the **ECM 1311**, a color monitor said to accommodate multiple add-on color cards.

According to the vendor, the monitor offers 720 by 540 dot/in. resolution and features an automatic frequency adjustment facility that allows it to interface with a personal computer using any add-on color card with a frequency range from 15 to 34 KHz.

The ECM 1311 is a red-green-blue monitor.

It costs $1,195.

Electrohome, 809 Wellington St. N., Kitchener, Ont., Canada N2G 4J6.

■

Cyberlogic, Inc. has introduced the **Datapen**, a bar code reader said to simplify bar code data entry into personal computers.

The Datapen installs between the keyboard and terminal. It offers keyboard emulation, uses no computer slot, does not require a serial port, does not interfere with keyboard operation and does not use a separate power source.

Models are available for the IBM Personal Computer, Personal Computer XT and AT; Apple Computer, Inc. Macintosh; NCR Corp. Personal Computer; AT&T PC 6300; and other personal computers.

Datapen costs $375.

Cyberlogic, P.O. Box 16644, Rocky River, Ohio 44116.

Board-level devices

Calpak Systems, Inc. has introduced the **Super 8 MHz PC/XT Engine**, a 4.7 or 8 MHz Intel Corp. 8088-2 IBM Personal Computer/Personal Computer XT motherboard.

The board accepts either IBM or industrial keyboards for rack mount and runs at 4.7 or 8 MHz, selectable from the keyboard during applications. Up to 640K bytes of memory are available.

Hardware is compatible with IBM bus expansion cards, and there is an external reset plug on the board. It also supports enhanced color graphics cards.

The engine costs $645 with 640K bytes, $595 with $256K bytes and $345 with zero kilobytes installed.

Calpak Systems, 1161 E. Sandhill Ave., Carson, Calif. 90746.

■

Redshift Ltd. has announced the **Imageworks Card** for Apple Computer, Inc.'s Apple II series computers.

The card is said to provide a full gray-scale display for graphics and image procesing.

The image is displayed on the Apple monitor and is overlaid on the regular Apple text or graphics display.

Imageworks can reportedly be used to display any digitized image information.

Imageworks costs $195.

There is a color option that costs $95.

Redshift, Suite 185, 101 First St., Los Altos, Calif. 94022.

Services

Microsoft Corp. has announced the **Microsoft Reference Library**, a series of reference books of technical data covering Microsoft operating systems, languages and applications software.

The first volume in the series is on MS-DOS Versions 1 to 3.2. It is called the *MS-DOS Technical Reference Encyclopedia* and covers topics including a history, internal system calls, register charts, graphical flow charts and a table of all possible error codes, according to the vendor.

The *MS-DOS Technical Reference Encyclopedia* will be published in June, Microsoft spokesmen said.

It costs $134.95.

Microsoft, 10700 Northrup Way, Box 97200, Bellevue, Wash. 98009.

Auxiliary equipment

Cabbage Cases, Inc. has introduced the **Light-Flite** computer carrying case.

The Light-Flite features built-in tilt wheels and a built-in extension handle, according to Cabbage Cases spokesmen.

It is said to hold an IBM Personal Computer packed in 1-in. polyester foam.

When not in use, the extension handle slips back into the carrying case.

The Light-Flite costs $205.

Cabbage Cases, 2458 Wood Ave., Columbus, Ohio 43221.

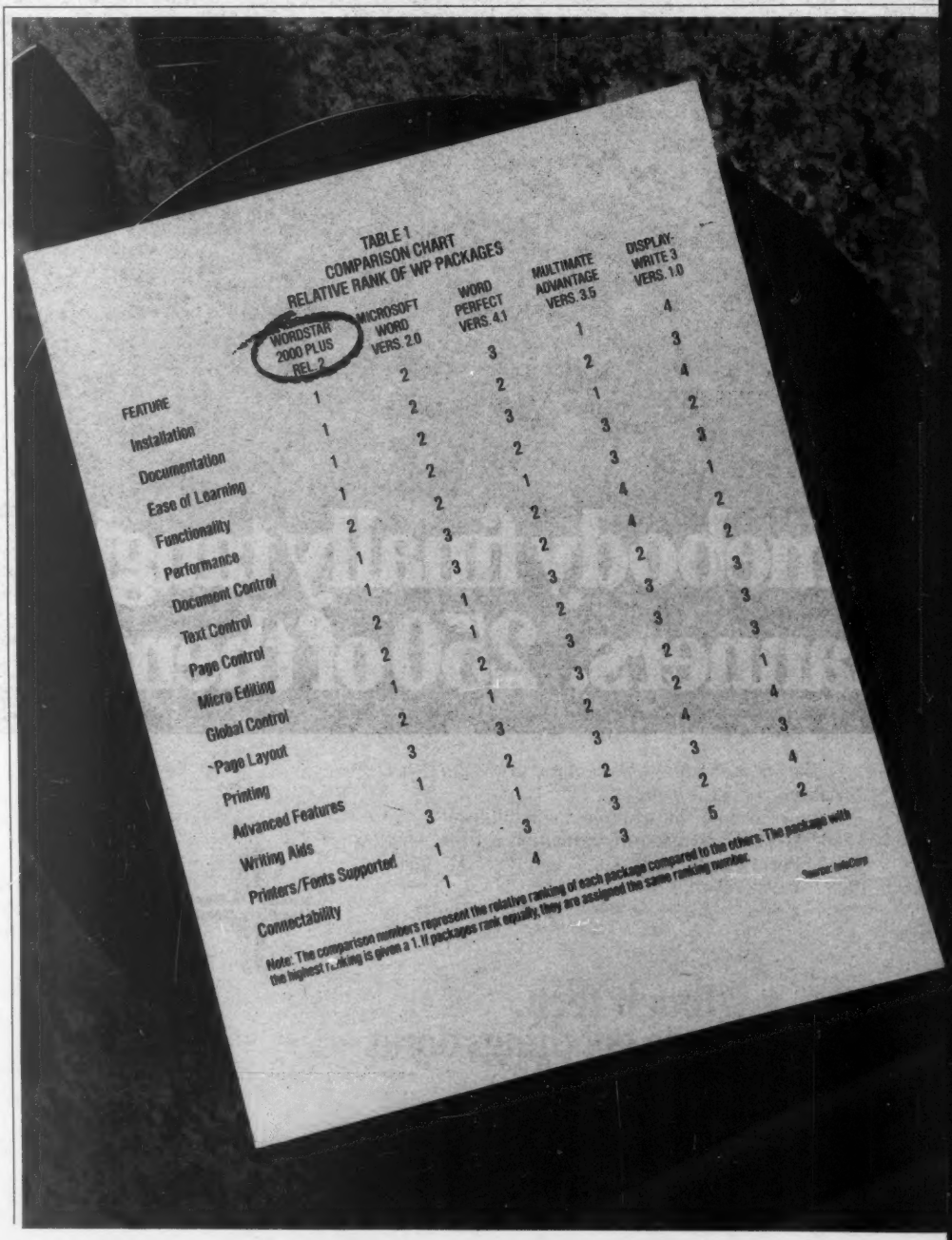

TABLE 1
COMPARISON CHART
RELATIVE RANK OF WP PACKAGES

FEATURE	WORDSTAR 2000 PLUS REL. 2	MICROSOFT WORD VERS. 2.0	WORD PERFECT VERS. 4.1	MULTIMATE ADVANTAGE VERS. 3.5	DISPLAY WRITE 3 VERS. 1.0
Installation	1	2	3	1	4
Documentation	1	2	3	2	3
Ease of Learning	1	2	2	1	4
Functionality	1	2	3	3	2
Performance	2	3	1	3	3
Document Control	1	3	2	4	2
Text Control	1	1	3	2	3
Page Control	2	1	2	3	3
Micro Editing	2	2	3	3	1
Global Control	1	1	2	2	4
Page Layout	2	3	3	4	3
Printing	3	2	2	3	4
Advanced Features	1	1	3	2	2
Writing Aids	3	3	3	5	2
Printers/Fonts Supported	1	4	1	3	5
Connectability	1	1	4	3	3

Note: The comparison numbers represent the relative ranking of each package compared to the others. The package with the highest ranking is given a 1. If packages rank equally, they are assigned the same ranking number.

Source: InfoCorp

RT Systems, Inc. has announced its **Keytrac** product, a microprocessor-based electronic lock key access system.

The IBM Personal Computer-compatible Keytrac system consists of a monitor, keyboard and electronic key panel, RT Systems spokesmen reported.

Each key panel has space for 50 key grips. Each grip is attached to a key or keys and then locked into the panel.

According to the vendor, an authorized password typed into the Keytrac terminal triggers the wired panel to release a key.

Keytrac also generates reports, the vendor said.

The cost of a Keytrac 50-space key panel is $3,000.

RT Systems, P.O. Box 809, Allen, Texas 75002.

COMMUNICATIONS

Controllers

Solid State Systems, Inc. has announced the **CEO Automatic Call Distributor**.

The product is said to provide for over 200 trunks and 125 agent distributors.

CEO Automatic Call Distributor reportedly provides for management reporting statistics and may be utilized as a fully featured private branch exchange/automatic call distributor.

Prices for the product range from $500 to $1,000 per line installed, according to Solid State Systems' spokesmen.

Solid State Systems, 1300 Shiloh Road N.W., Kennesaw, Ga. 30144.

Software

Campaigner, an automated telemarketing system that accommodates up to 24 users on Northern Telecom, Inc.'s Meridian DV-1 data/voice system, has bowed from **Opus Corp.**

The software reportedly provides automatic dialing, scripting via decision tree matrices with answers and associated weighted values plus discrete supervisor and operator functionality.

Written in C, Campaigner also generates management reports, prospect records and follow-up correspondence.

It follows up leads automatically by day and time, according to the vendor.

Campaigner will reportedly be available in April for about $15,000, depending on system configuration.

Opus, 20251 Century Blvd., Germantown, Md. 20874.

■

Instant Information, Inc. has introduced **Instantcom**, a software package designed for use with Western Union Co.'s Easylink, ITT's Dialcom and Timetran electronic mail and telex services.

Instantcom is function-specific to each service, according to vendor spokesmen.

It comes with its own word processor.

For Easylink and Dialcom, it reportedly offers transfer capability of binary files.

Instantcom costs $120.

With a 1,200 bit/sec. Hayes Microcomputer Products, Inc.-compatible modem, it costs $379, the vendor reported.

Instant Information, Suite 380, 15110 S.W. Boones Ferry Road, Lake Oswego, Ore. 97034.

■

Fischer-Innis Systems Corp. has introduced **Release 2.5** of its **Electronic Mail Communication Center** (Emc2) system.

The new release includes the Emc2/IBM Distributed Office Support System interface, an electronic forms feature and extended IBM 3270-type printer support.

Other features include scrolling in baskets and out baskets, bulletin boards for electronic network conferencing, mailing lists and electronic file folders.

The vendor said the MVS version leases for $800/mo. The CMS version leases for $700/mo. The VSE version leases for $500/mo.

Purchase prices start at $18,000 for MVS, $16,000 for CMS and $14,000 for VSE.

Fischer-Innis Systems, 4175 Merchantile Ave., Naples, Fla. 33942.

Multiplexers/modems

Compu-Mech has introduced the **CD4000/RFX** full-duplex modem.

The modem is a radio frequency transceiver that is said to allow up to 63 remote locations to be linked in a network. It operates at 1,200 bit/sec.

Features include a full-duplex serial ASCII channel over a radio frequency link; 16-bit cyclic redundancy check error checking with automatic retries; and standard RS-232, RS-422, RS-423, RS-485 serial interfaces.

The modem costs $1,800.

Compu-Mech, Suite 75, 5242 Angola Road, Toledo, Ohio 43615.

■

Telenex Corp. has introduced the **Autonex Modem Eliminator** and the **Cable Converter Unit CCU-V.35**.

The Modem Eliminator is said to replace two synchronous modems and to multiplex and transmit all RS-232 signals over four-wire cable at distances up to 1,000 feet. It offers selectable transfer rates of 1,200, 2,400, 4.8K, 9.6K and 19.2K bit/sec.

The CCU-V.35 is said to provide transmission rates up to 64K bit/sec. or 256K bit/sec. It transmits 16 V.35 interface signals up to 1,000 feet.

The Modem Eliminator costs $120, and the CCU-V.35 costs $130.

Telenex, 502 Pleasant Valley Drive, Moorestown, N.J. 08057.

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In a comparative report—the report containing the chart to the left—Robert Lefkowits of InfoCorp said:

"WS 2000+ emerges as a clear winner in overall applicability. InfoCorp believes WS 2000+ would appeal to the largest number and widest variety of users. Its layered functionality, ease of learning, and excellent communications features make it ideal for corporate users, ranging from secretaries to clerks to managers to executives."

And, after reviewing WordStar 2000 Plus Release 2 alongside MultiMate™ Advantage™ and IBM®'s DisplayWrite® 3, International Data Corporation's Jim Chapman concluded:

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NEW PRODUCTS/COMMUNICATIONS

Local-area networks

David Systems, Inc. has added the **David Coax Eliminator** and the **David Analog Set Adapter** to its David Information Manager Ethernet-compatible integrated voice and local-area network.

The 3270 Coax Eliminator links IBM 3270 display stations to IBM control units over standard twisted-pair telephone wire at distances up to 3,000 feet.

The Analog Set Adapter allows customers to use existing analog telephone sets to gain access to the David Information Manager.

Pricing starts at $225 per connection.

David Systems, 701 E. Evelyn Ave., Sunnyvale, Calif. 94086.

Network services

Dovtrex, a data-over-voice switching system for networking data in existing Centrex or private branch exchange telephone systems has debuted from **Gandalf Data, Inc.**

The system supports data networking up to 64K bit/sec. over two wire telephone systems without affecting voice network operations.

Each switching node can support from eight to 740 users and attached devices. By networking nodes together, up to 23,500 users and attached devices can be served.

Prices, including full redundancy, range from about $450 per attached device for a system serving 740 devices to $550 per attached device in a system serving 128 devices.

Gandalf Data, 1020 S. Noel, Wheeling, Ill. 60090.

■

Xyplex, Inc. has unveiled an Ethernet-compatible version of its **Xyplex** communications system for Digital Equipment Corp. computers.

VAX users in an Ethernet environment can now add the Xyplex system without having to install any additional cabling, regardless of whether the environment is a single Ethernet system or consists of multiple local-area networks with a corporatewide broadband system.

The host interface unit and cluster controller cost $3,700 and $2,575, respectively.

Xyplex, 100 Domino Drive, Concord, Mass. 01742.

■

Innovative Electronics, Inc. has announced **Netmaster**, a retail system said to interface the NCR Corp. point-of-sale terminals to an IBM Systems Network Architecture mainframe.

Netmaster consists of two elements: Netmaster/AP, a host resident Cobol applications program that performs configuration, control and monitoring of the network, and Netmaster/IS, an in-store multifunction computer that provides the interface.

Netmaster is priced ranging from $5,000 to $15,000.

Innovative Electronics, 4714 N.W. 165th St., Miami, Fla. 33014.

■

Cincom Systems, Inc. has announced **Release 1.5** of **Net/Master**, its network management system.

The release supports IBM's MVS/XA. The multiple-session support has been enhanced as well as the network access, the advanced network management component and the file transfer component. General enhancements include a tracing facility to trace IBM 3270 data streams, a tutorial facility and the user-access management system data set.

Release 1.5 of Net/Master will be provided to current users at no charge. Net/Master is priced from $15,000.

Cincom Systems, 2300 Montana Ave., Cincinnati, Ohio 45211.

Test equipment

Northern Telecom, Inc. has announced the **Interface Display Panel 816** (IDP-816) and the **Digital Patch Unit 2403A** (DPU-2403A), two technical control products for monitoring data communications networks.

The IDP-816 monitors data signals on 16 RS-232 lines without affecting communications.

Audible and visual alarms are provided.

The DPU-2403A provides nonblocking digital patching, monitoring and test access capabilities.

The IDP-816 is priced at $1,150, and the DPU-2403A costs $1,900.

Northern Telecom, 344 New Albany Road, Moorestown, N.J. 08057.

■

Northern Telecom, Inc. has announced the **Intelligent Matrix 3000 Switch** (IM 3000) system said to simplify switching, access for testing and monitoring for data communications networks.

The IM 3000 is a full-function matrix switch with computer control added, the vendor said.

The product was designed for multivendor data networks starting at 50 lines and supports up to eight local or remote workstations, according to the vendor.

The IM 3000 supports most industry standard interfaces including analog and V.35 interfaces at speeds up to 308K bit/sec.

The IM 3000 costs $82,000.

Northern Telecom, 344 New Albany Road, Moorestown, N.J. 08057.

■

Telenex Corp. has introduced the **Model 1070 application cartridge** said to provide its Portascope with testing and simulation within IBM's Systems Network Architecture/Synchronous Data Link Control (SNA/SDLC) network environments.

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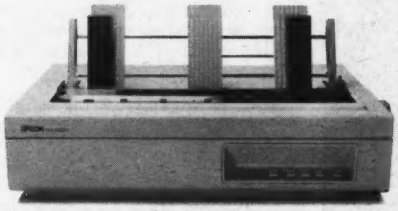
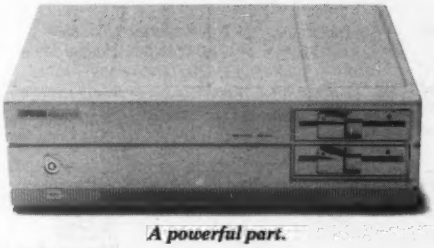


A fast part.



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Both active and passive testing routines are available. Scan and trace buffers allow step-by-step review of any test sequence following execution. Any DAF, OAF or other protocol parameter can be isolated and captured using start and stop traps and bit masks. All captured information can be decoded in SDLC or SNA formats or in hexadecimal.

The Model 1070 application cartridge costs $200.

Telenex, 502, Pleasant Valley Ave., Moorestown, N.J. 08057.

Auxiliary equipment

DB Delta Computer Systems, Inc. has released **Call Reporter**, a telephone call reporting system designed to run on IBM Personal Computers and compatibles.

Call Reporter connects to a private automatic branch exchange (PABX), collecting call information from the PABX system's station message detail recorder output via the RS-232 port. The system allows users to input hourly labor rates, per-minute telephone charge rates and up to 10 categories of overhead items that are apportioned to each of up to 200 extensions on a per-minute basis.

Call Reporter costs $495.

DB Delta Computer Systems, Suite 280, 19725 Sherman Way, Canoga Park, Calif. 91206.

■

Network Systems Corp. has announced the **Hyperchannel B** series line of adapters said to provide communications among workstations, mainframes and personal computers at 10M bit/sec.

Included in the B series are the BC222 adapter, which connects to the IBM 4300, 3080 and 3090 series; the BC110 adapter, which connects to Cyber 70, 170, 700 and 800 series mainframes from Control Data Corp.; the BC403 adapter, which connects up to four minicomputers, workstations or both via a coprocessor board; and the PC Dataport PI270 and PI370 coprocessor boards, which allow an IBM Personal Computer or Personal Computer XT to function concurrently in any of three modes, according to the vendor.

Prices for the average network connection are said to be as follows: $20,000 for the BC110 and the BC222, $9,600 for the BC403, $995 for the PC Dataport PI270 and $1,295 for the PI370.

Network Systems, 7600 Boone Ave. N., Minneapolis, Minn. 55428.

OUR PART.

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Visit the Epson showroom during VAR Congress at Dallas Infomart, March 18-20.

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SYSTEMS & PERIPHERALS

Turnkey systems

Digital Equipment Corp. has announced the **Vaxlab Real-time Workstation**, designed for laboratory data acquisition and experiment control, that incorporates the Microvax II system.

The workstation is a 32-bit word-length system. It is said to be available in both single-user and multiuser versions.

A single-user configuration includes 2M bytes of memory, a 71M-byte disk, a 95M-byte cartridge tape drive, DEC Decnet and Ethernet connecting hardware, a graphics subsystem, real-time clock and associated software.

The multiuser version incorporates an eight-line communications interface in place of the graphics subsystem.

Vaxlab systems are priced from $29,055.

DEC, Maynard, Mass. 01754.

Processors

Integrated Digital Products has introduced the **5 MIPS Whetstone** processor.

The 5 MIPS Whetstone was designed for applications requiring support of eight to 32 ports. According to the vendor, it executes instructions in 200 nsec. It offers standard onboard memory capacity of 128K bytes, expandable to 32M bytes. It can be upgraded to the vendor's 100 and 50 nsec CPUs.

The 5 MIPS Whetstone costs $10,500.

Integrated Digital Products, 4208 E. La Palma Ave., Anaheim, Calif. 92807.

■

L/F Technologies, Inc. has introduced the **LFT 1650**, a 30-user computer said to allow for more users, more mass storage and fully integrated backup power to Software 2000 Inc.'s TurboDOS operating environment.

The LFT 1650 supports up to 30 user boards, each with a dedicated 80186 processor and 1M byte of random-access memory. It also supports up to three 140M-byte Winchester drives, two 8-in. floppy disk drives and one 5¼-in. floppy drive.

Prices start at $7,495.

L/F Technologies, 2800 Lockheed Way, Carson City, Nev. 89701.

■

NCR Corp. has added the **NCR 9300IP** and **9400IP** models to its NCR 9000 family of interactive computer systems.

Both systems use NCR's ITX operating system and 32-bit very large-scale integration technology. Both systems contain an integrated 45M-byte, ¼-in. streaming-tape unit and an integrated 72M-byte, 5¼-in. Winchester fixed disk. They both support small computer systems interface disks, magnetic tapes and printers as well as a variety of communications protocols.

The NCR 9300IP is priced from $50,075. The NCR 9400IP is priced from $76,075.

NCR, 1700 S. Patterson Blvd., Dayton, Ohio 45479.

NEW PRODUCTS/SYSTEMS & PERIPHERALS

Digital Equipment Corp. has announced the **IPQS3**, the **IPUS1** and the **IPUS2**, industrial I/O members of the Packaged Automation Systems (PAS) family.

The IPQS3 includes DEC's industrial I/O subsystem with the Micro/PDP-11/83 computer.

The other two PAS members are said to incorporate a subsystem chassis with Unibus architecture PDP-11/24 and PDP-11/84 minicomputers.

According to the vendor, all three are expandable up to 80 process I/O modules and screw terminals.

The products run under the RSX-11 operating system.

DEC Q-bus sustems are priced from $30,000, the vendor said.

The prices of the Unibus PDP-11/24 and PDP-11/84 systems start at $29,750 and $33,000, respectively.

DEC, Maynard, Mass. 01754.

Data storage

Telebyte Technology, Inc. has announced the **TDX-45/5360**, a ½-in. magnetic tape system for the IBM System/34 and 36 and IBM 5362 and 5364.

The tape system can be set to transfer data at the maximum speed of the communications line — 28.8K bit/sec. to 56K bit/sec or 10M to 14M bytes per hour. It also comes with a bisynchronous interface and a tape utility software package.

The TDX-45/5360 costs $8,950.

Telebyte Technology, 270 E. Pulaski Road, Greenlawn, N.Y. 11740.

■

DY-4 Systems, Inc. has added the **DVME-715 Intelligent SMD Disk Controller** to its family of VMEbus modules.

The DVME-715 is said to be an intelligent I/O controller that can support up to two SMD-compatible disk drives. It contains a Motorola, Inc. 68000 CPU with 64K bytes of dynamic random-access memory, a discrete direct memory access controller and a burst error processor for error detection and correction.

Other features include data transfer rates to 20M bit/sec., 24-bit addressing and 16- or 32-bit transfers to or from VMEbus.

The DVME-715 costs $2,697.

DY-4 Systems, Suite 202, 1475 S. Bascom Ave., Campbell, Calif. 95008.

■

EMC Corp. has announced the **VX86-16MB**, a 16M-byte memory expansion board featuring 1M-bit random-access memory technology, for Digital Equipment Corp.'s VAX 8600 and 8650 computers.

The board is said to allow the VAX systems to be configured up to 128M bytes of physical memory. It provides 15.4M bytes of main memory per board and allows system configurations with 4M-byte and/or 16M-byte boards up to 128M bytes.

The VX86-16MB costs $58,000.

EMC, 12 Mercer Road, Natick, Mass. 01760.

Terminals

Soroc Technology, Inc. has announced the **Elite**, a Tandem Computers, Inc.-compatible terminal.

The Elite is a 14-in. tilt-screen terminal said to emulate Tandem's 6530 family. It features a green phosphor screen; display memory support with 300 lines or 12 pages in block mode; menu screen configuration, asynchronous communications, half or full duplex, supporting RS-232C and current loop interface; serial printer port; and optional integrated 300/1,200 bit/sec. modem.

The Elite costs $995.

Soroc, 161 Freedom Ave., Anaheim, Calif. 92801.

■

IBM has announced the **3164 ASCII Color Display Station** said to offer eight colors on a high-resolution 14-in., 80-char. by 25-line monitor.

The 3164 is upwardly compatible from the 3161 and 3163 displays. In native mode, it will default to four colors.

Features of the display include keyboard with 12 definable function keys and a numeric keypad, RS-232C and RS-422A communications ports and selectable speeds to 19.2K bit/sec.

Prices for the 3164 start at $725.

IBM, Old Orchard Road, Armonk, N.Y. 10504.

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Printers/plotters

Tektronix, Inc. has announced the **CX4692S** IBM-compatible **Color Graphics Output System**.

The system is said to provide color output for IBM 3270 environments. It combines the vendor's 4692 Color Graphics Copier with the CX4510A Color Graphics Rasterizer.

The system can be used with MVS and VM operating systems. The base price is $14,995.

Tektronix, P.O. Box 1700, Beaverton, Ore. 97075.

■

Tandem Computers, Inc. has announced two line printers for use with the company's Nonstop systems: the **5515 desktop model** and the **5516 free-standing model**.

The 5515 is said to print at 300 line/min, and the 5516 is said to print at speeds up to 600 line/min. Both feature line matrix technology and a self-test diagnostic.

The 5515 model costs $7,200, and the 5516 model costs $11,900.

Tandem Computers, 19333 Vallco Pkwy., Cupertino, Calif. 95014.

■

Gerber Scientific Instrument Co. has added the **Model 5688** to its Autoprep 5000 automated stripping system and its family of graphics arts equipment.

The Model 5688 reportedly offers precision photoplotting, cutting or scribing at speeds of 3,600 in./min as well as a 40- by 48-in. photoplotting area. Another feature is off-line operation, allowing it to plot one job while another is being input.

The Model 5688 costs $122,000, including photoplotting head.

Gerber Scientific, P.O. Box 305, Hartford, Conn. 06101.

Power supplies

Todd Products Corp. has added the **MDT-400** series to its line of multioutput switching power supplies.

The MDT-400 series includes models with a 50A to 60A 5V output with load and line regulation of plus or minus 1%. The components are surface mounted to the underside of the board.

Prices start at $535.

Todd Products, 50 Emjay Blvd., Brentwood, N.Y. 11717.

■

Displex, Inc. has announced the **Displex PLC series** line conditioners featuring a surge-protected RJ-11 data link and a plug-in AC power surge suppressor.

The series protects electronic equipment against voltage spikes and surges.

The Displex PLC series has a noise rejection of 130db common mode and 80db normal mode.

Units are available in 500VA, 1, 2 and 3-kVA power ratings. Prices range from $395 to $935.

Displex, 1 Alexander Place, Glen Cove, N.Y. 11542.

Kalglo Electronics Co. has announced the **Line Saver**, a standby uninterruptible power system.

The Line Saver was designed to provide standby backup power in 120V or 240V, 60 Hz or 50 Hz with 250W capacity. The unit uses pulse-width modulation technology.

The unit comes with a 6-ft detachable three-prong grounded cord set with a CEE-22 connector.

The Line Saver costs $549.

Kalglo Electronics, Department CP, 6584 Ruch Road, Bethlehem, Pa. 18017.

Components

Datel has announced the **ST-702** analog I/O board and the **ST-701** analog-to-digital coprocessor board for Intel Corp. Multibus-based computers.

The ST-701 was designed to offload its host Multibus central processor. The ST-702 is suited for thermocouple measurements. It offers isolation, 60Hz line rejection and screw terminal input terminations.

The ST-701 is priced ranging from $1,255 to $1,685. The ST-702 is priced at $1,095.

Datel, 11 Cabot Blvd., Mansfield, Mass. 02048.

■

Datacube, Inc. has introduced **Minvideo**, a real-time image processing subsystem, and has added three modules to its **Maxvideo** product line.

Minvideo-10 and Minvideo-7 are 512- by 512- by 8-bit and 384- by 512- by 8-bit resolution boards for Intel Corp.'s Multibus or IIbx-based computers. Both are said to provide full video image acquisition, signal processing, storage and display capabilities.

The Maxvideo boards are Max-XFS, a real-time image transposing frame store module; Addgen-1, an address generator module; and Interpolator, a multirate sampling module with subpixel precision.

Minvideo-10 costs $5,995. Minvideo-7 costs $4,995, Max-XFS and Interpolator cost $3,215 and Addgen-1 costs $1,200.

Datacube, 4 Dearborn Road, Peabody, Mass. 01960.

■

DSP Systems Corp. has announced the **VAP-FS Frame Store**, said to be capable of storing a snapshot of 50-MHz data.

The Frame Store is VMEbus compatible and can capture up to 32K 16-bit words in snapshot mode. The Frame Store is reportedly a 2½-port memory.

The half port is used to write data, and the other two ports control the starting address, word count and data acquisition trigger. When the acquisition is completed, each full port can simultaneously read or write locations with the 32K-word memory.

The VAP-FS Frame Store costs $2,400.

DSP Systems, M/S-E, 1081 N. Shepard, Anaheim, Calif. 92806.

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Auxiliary equipment

Safety Screen for VDTs has bowed from **Novotek Corp.**

The product enhances contrast, reduces glare and attenuates radiation on monochrome, color and high-resolution VDTs, the vendor claimed.

The device is said to shield VDT operators from very low-frequency electrical emissions.

Safety Screen sells for $65.

Novotek, 14 Commercial Blvd., Novato, Calif. 94947.

■

Salsbury Industries has announced **Datasafe Document Security System**, a lockbox system said to provide secured hard-disk storage.

Datasafe uses key locks similar to those used in U.S. Postal Service post office boxes. It is available in a double-entry design for communicating walls and in a Roll-A-Bout wheeled version.

Prices start at $149 for one single-entry wall-mounted module. The Roll-A-Bout starts at $220.

Salsbury Industries, 1010 E. 62nd St., Los Angeles, Calif. 90001.

■

Curtis Manufacturing Co. has introduced the **Touch Me First** static mat.

The static mat was designed to eliminate static discharge, thereby protecting computers and other electronic equipment from blown chips, lost data and other problems. The mat is placed beneath the system, and the user simply touches it to discharge static electricity before touching the system.

The Touch Me First static mat is priced at $39.95.

Curtis Manufacturing, 305 Union St., Peterborough, N.H. 03458.

■

The **Harris/Lanier Business Information Systems Thought Processing Division** of **Lanier Business Products, Inc.** has announced a **Light-Pen Identification** station as an accessory to its systems dictation product line.

The Light-Pen Identification is said to read bar codes generated by the vendor's Barcode Label Production Unit. The bar code maker consists of a custom Lanier interface, the Lanier Concept 1200 workstation, keyboard and a letter-quality, high-speed printer. The new accessory is available on all Lanier central system dictation products.

The Light-Pen system retails for $345. The bar code printer, interface and keyboard cost $2,200.

Harris/Lanier, 1700 Chantilly Drive N.E., Atlanta, Ga. 30324.

■

Interaction Systems, Inc. has introduced the **Series 3000 Touch Screen** for interactive video applications.

The continuous-touch 19-in. screen can reportedly be installed in most monitors with total electrode concealment. It features a ½-in. electrode system around the edge and provides better than 80% light transmission. It is installed with a double-faced adhesive gasket and is aligned by touching four points on the screen.

The Series 3000 Touch Screen, including controller board, costs $395.

Interaction Systems, 24 Monroe St., Newtonville, Mass. 02160.

PRICE REDUCTIONS

Hemming Morse, Inc. has released **Version 2** of its **Focus: ABC Audit** and **Focus: ABC Compilation** audit software systems and reduced their prices.

Version 2 of both programs is fully compatible with Lotus Development Corp. 1-2-3 Release 2. The new pricing is as follows: Focus: ABC Audit costs $495 for a machine license and $1,495 for an office license. Focus: ABC Compilation costs $295 for a machine license and $995 for an office license.

Hemming Morse, #320, 1700 S. El Camino Real, San Mateo, Calif. 94402.

■

Versatec, Inc. has announced a price cut for its **CE 3236** and **CE 3224** electrostatic color plotters.

The plotters provide for seven line colors and 256 predefined area colors. The CE 3236 now costs $59,500, and the CE 3224 now costs $44,500.

Versatec, 2710 Walsh Ave., Santa Clara, Calif. 95051.

Verticom, Inc. has announced a price reduction for its **M-16** and **M-256** graphics boards.

The suggested list prices are now $1,695 for the M-16 color graphics controller and $1,295 for the M-256 color graphics controller. The CD-1 color display costs $995.

Verticom, 545 Weddell Drive, Sunnyvale, Calif. 94089.

■

Peachtree Software, Inc. has announced a price reduction for its **Back to Basics** accounting system for the Apple Computer, Inc. Macintosh.

Back to Basics is a double-entry, accrual accounting system. It includes general ledger, accounts receivable and accounts payable software, which are now available bundled into a "3 pak."

The 3 pak costs $395. Individual modules cost $175 each.

Peachtree Software, 4344 International Blvd., Norcross, Ga. 30093.

■

Metatek, Inc. has dropped the price of its **Metascope-PC**.

The Metascope-PC is a hardware/software extension to the IBM Personal Computer said to provide a data line monitoring capability to replace stand-alone monitors. It supports synchronous and asynchronous protocols at speeds up to 19.2K bit/sec. The new price is $1,595.

Metatek, P.O. Box 33129, 290 Coon Rapids Blvd. N.W., Minneapolis, Minn. 55433.

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CALENDAR

WEEK OF MARCH 9

MARCH 10-14, NEW YORK — **Modern Structured Analysis Workshop.** Contact: Palmer Consulting, 353 W. 12th St., New York, N.Y. 10014.

MARCH 11-14, AMSTERDAM — **Retail Europe '86.** Contact: Spectra, Spectra House, 9A Peach St., Wokingham, Berks RG11 1XJ, England.

MARCH 12-14, DETROIT — **Artificial Intelligence for the Automotive Industry — The Demystification.** Contact: Dale Mason, Technical Activities Department, Society of Manufacturing Engineers, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

MARCH 13, NEWTON, MASS. — **AWC — Where's the Money: Where are the High-Paying Jobs on the Fast Track?** Contact: Deborah Dupee, Program Director, Association for Women in Computing, Suite 21, 66 Chiswick Road, Brookline, Mass. 02146.

WEEK OF MARCH 16

MARCH 17, BOSTON — **Establishing the Executive Workstation.** Contact: Diane Rodgers, DMR Associates, Inc., 57 River St., Wellesley Hills, Mass. 02181.

MARCH 17-19, ORLANDO, FLA. — **Managing and Motivating for Improved Productivity.** Contact: Marilyn S. Bodek, Data Entry Management Association, P.O. Box 16711, Stamford, Conn. 06905.

MARCH 17-19, HONG KONG — **Conference on Computer Control, Audit & Security in Banking and Finance.** Contact: Conference Chairman, P.O. Box 212, Georgetown, Ont., Canada L7G 4Y5.

MARCH 17-20, WASHINGTON, D.C.— **Software Development for Government.** Contact: Conference Manager, U.S. Professional Development Institute, 1620 Elton Road, Silver Spring, Md. 20903.

MARCH 17-21, BALTIMORE — **Basic Systems Analysis.** Contact: Thomas J. Bisacquino, Director of Education, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

MARCH 17-21, BOSTON — **James Martin's Productivity Seminar.** Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402. Also being held March 24-28 in Washington, D.C.

MARCH 17-21, MILWAUKEE — **Test Data Acquisition and Processing for Instrumentation Applications.** Contact: John T. Snedeker, Program Director, Center for Continuing Engineering Education, University of Wisconsin-Milwaukee, 929 N. Sixth St., Milwaukee, Wis. 53203.

MARCH 18, SAN JOSE, CALIF. — **U.S. Invitational Computer Conference Series.** Contact: Suzanne Hubner, U.S. Conference Director, The Invitational Computer Conference, No. C-2, 3151 Airway Ave., Costa Mesa, Calif. 92626.

MARCH 18-20, ALBUQUERQUE, N.M. — **Integrated Fiber-Optic Technology Training.** Contact: Linda Castle, Optoelectronic System Consultants, P.O. Box 35525, Albuquerque, N.M. 87176.

MARCH 18-21, LAS VEGAS — **Check Processing.** Contact: Peggy Meyer, Bank Administration Institute, 60 Gould Center, Rolling Meadows, Ill. 60008.

MARCH 19-20, NEW YORK — **The 1986 Strategic Planning Conference.** Contact: The Conference Board, Inc., P.O. Box 4026, Church St. Station, New York, N.Y. 10261.

MARCH 19-21, LAS VEGAS — **CDLA Spring Meeting.** Contact: Dianne L. Sims, Manager of Convention Planning, Computer Dealers and Lessors Association, Inc., 1212 Potomac St. N.W., Washington, D.C. 20007.

MARCH 19-21, BLACKSBURG, VA. — **Personal Computer Interfacing for Scientific Instrument Automation.** Contact: Linda Leffel, Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061.

WEEK OF MARCH 23

MARCH 24-26, CHICAGO — **Systems One Conference and Exposition.** Contact: Michael A. Tew, Technical Activities Department, Society of Manufacturing Engineers, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

MARCH 24-26, LAS VEGAS — **Fifth Annual International Spectrum USA.** Contact: Amy Krainock, International Data Base Management Association, Suite 104, 9740 Appaloosa Road, San Diego, Calif. 92131.

MARCH 24-26, LAUREL, MD. — **Association for Computing Machinery's Conference on Ada Use in Focus: Practical Lessons in Perspective.** Contact: Connie Finney, Johns Hopkins University, Applied Physics Laboratory Computer Society, Johns Hopkins Road, Laurel, Md. 20707.

MARCH 24-27, SINGAPORE — **Artificial Intelligence '86 Conference: AI and its Applications — A State of the Arts Review.** Contact: John Tagler, Elsevier Science Publishers, 52 Vanderbilt Ave., New York, N.Y. 10017.

MARCH 26-27, CAMBRIDGE, MASS. — **The Lotus Developer Conference.** Contact: Mark Scapicchio, Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, Mass. 02142.

WEEK OF MARCH 30

MARCH 31-APRIL 1, NEW YORK — **Software Tools Conference on Artificial Intelligence/Expert Systems.** Contact: Software Tools Conference, Conference Office, Suffolk University, Boston, Mass. 02108.

MARCH 31-APRIL 2, RICHMOND, VA. — **The Annual Parnassus Management Conference.** Contact: Parnassus, Inc., 100 Boylston St., Boston, Mass. 02116.

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AT&T chairman announces retirement in annual report

Document focuses on divestiture, cost cuts

By Bryan Wilkins

AT&T Chairman Charles Brown will retire next August, he announced in his message to shareholders in the 1985 AT&T annual report mailed last week.

Brown's letter to shareholders cited the impending retirement but did not indicate who his successor might be. Speculation has centered on current President James Olson as well as Morris Tannenbaum, executive vice-president.

In his final report as head of the communications giant, Brown said that the company has regained the initiative since its divestiture in 1984. Brown called the divestiture "the most shattering reorganization in business history."

Reflecting a cost-conscious posture that prevails in the competitive telephone business, the annual report contained wallet-size photos instead of the full-page glossy displays of switching systems that were common in predivestiture days.

With regard to its sluggish sales of computer equipment, AT&T only recited the introduction of "the most complete line of computers in the shortest time of any company in our field."

The annual report did not comment on the consumer response to the Personal Computer 6300 and the 3B line.

The company said it is continuing to expand use of its Unix operating system by aggressively stimulating development of Unix applications programs.

The report emphasized that the communications giant is still wrestling with the reorganization of a company that earned $34 billion in 1985 revenue. "Cost-reduction has been and will continue to be a major challenge. It became very clear as we entered the hotly competitive postdivestiture environment that our cost structure was too high to achieve a level of earnings expected of a high-technology business," Brown said.

Revenue from the telecommunications side of AT&T's business was $17.2 billion in 1985 compared with $15.7 billion in 1984. Its equipment products, which include computers, private branch exchanges and central office switches, achieved sales of $11.8 billion in 1985, compared with $10.1 billion in 1984.

Peachtree's niche after the storm

From page 114

Peachtree Software International to foreign distributors.

MSA held onto its micro-mainframe link product called Peachlink, later renamed Expertlink, and Peachtree itself discontinued nonvertical programs such as Decision Management, an integrated package. "Rather than fight the heavies like Lotus Development Corp., we decided to throw in the towel in that market," Goodhew says.

The company went from 116 employees to its present status of under 50, while sales dropped substantially, according to Goodhew. To stimulate product demand, Peachtree has

Computer industry section begins on page 114.

shifted its emphasis from distributors to dealers and users.

"I think they are in good hands at Intelligent Systems, and their refocusing of product emphasis is timely," says Ben J. Dyer, a cofounder and the president of Peachtree Software at its beginnings in 1978 as an offering of Retail Sciences, Inc., a turnkey systems supplier.

"It is a difficult market, so there will be ups and downs. But they have had a lot of good experience in the market as well," says David Ferris, chairman of Ferrin Corp., a micro support firm in San Francisco.

Others are more skeptical. "I think Peachtree will do all right, but I don't think they will make any sort of killing because they just don't have the sophistication in their packages. There are cheaper and better packages out now, and these will attract more business," said Robin Raskin of International Resource Development, a market research firm in Norwalk, Conn.

In the long run, Peachtree's potential for success is inextricably linked to the future course of microcomputer software. It is no secret that the industry has experienced less than phenomenonal growth in the past 12 to 18 months, and no one is quite sure what to expect in 1986.

"Instead of growing at 200% a year as many expected, the microcomputer industry is growing at 35% a year or so," Goodhew estimates. "Because it was less than expected, there were too many players and too many dealers and too many products. Until we reach a level of maturity in the market, this overcapacity is going to continue to kill companies."

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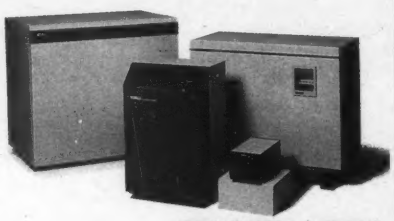

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Burroughs denies reports that internal disputes led to layoffs

Firm blames facilities consolidation for cuts

By James Connolly

DETROIT — Burroughs Corp. officials have denied reports that 140 employees at a Burroughs research facility in Boulder, Colo., were fired because of a dispute about whether their work met company compatibility requirements.

Meanwhile, a former Burroughs executive who spent more than 20 years with the company acknowledged that the communications software work done at the Boulder Advanced Systems Group had caused political problems within Burroughs. However, that former employee, who asked not to be identified, theorized that the Boulder facility was closed because it was outdated and doing redundant work, not because of any dispute. The 140 technical staff workers were dismissed last month as part of a worldwide consolidation under which Burroughs laid off 900 workers [CW, Feb. 17].

"Those people were not fired," said Burroughs spokesman Irving Geller. "It was just part of a consolidation of facilities. The company looked at the situation and decided that a large part of the work could be done elsewhere. They decided that the best way to do the research was in other facilities. Boulder staff members were not going off on their own. In a modern $5 billion corporation, you just do not have projects going off on their own."

The Boulder group, formed in 1983, reportedly was developing Unix-based systems software for a 50M bit/sec. fiber-optic network. According to Geller, that same work is done in other facilities, which will continue the research. Some of that Unix research is done at Burroughs facilities in Downington, Pa.; Lake Forest, Calif.; and Flemington, N.J.

The former Burroughs official, who acknowledged that the dispute existed and that the Boulder work was "a really controversial subject," reported that some managers from Boulder were transferred to Burroughs' Memorex Corp. subsidiary some two months ago.

That official also said the worldwide consolidations should have been done two years ago and that the moves "will add profit to the bottom line."

Many of the 900 layoffs were targeted on Cumbernauld, Scotland, where 350 employees at a superminicomputer production facility will be laid off by June 30. Burroughs facilities in Carlsbad, Calif., and Coral Springs, Fla., will be closed, while there will be cutbacks at plants in Pasadena, Calif., and Rancho Bernardo, Calif.

Datapoint posts $8.4 million quarterly loss

By James A. Martin

SAN ANTONIO — Datapoint Corp. reported second-quarter losses of $8.4 million for the period ended Jan. 25. That compares with a year-earlier second-quarter loss of $28.9 million on a pro forma basis, or $15.8 million when including results from Intelogic Trace, Inc., the computer maintenance company spun off by Datapoint in July 1985.

The company said its annual stockholders meeting has been postponed pending a leveraged buy-out proposal by an investor group led by Asher B. Edelman and Charles P. Stevenson Jr.

The investor group is in the process of arranging financing plans. The annual meeting, which had been scheduled for late February, will not commence until financing is completed.

This year's second-quarter revenue was $79.8 million, including an extraordinary credit of $3.5 million, compared with a loss of $129.5 million one year earlier.

Equipment orders up about 50%

Second-quarter equipment orders were up about 50% compared with the first quarter, said Datapoint President and Chief Executive Officer Edward Gistaro.

In addition, the company divested itself of a minority interest in Teknekron Infoswitch Corp., according to Datapoint, which resulted in a net loss of $1.1 million.

Separately, Intelogic Trace reported net earnings of $5 million for its second quarter ended Jan. 25, compared with pro forma earnings of $4.5 million for the year earlier.

Revenue was $39.6 million, compared with $38.5 million in second-quarter 1985. Earnings per share were 32 cents per share for the most recent quarter and 24 cents per share for second quarter 1985, the company reported.

Figures for Intelogic Trace in 1985 were determined on a pro forma basis to reflect changes that would have resulted from the operation of the company as an independent entity, a spokesman said.

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NICKELS AND DIMES

Autodesk, Inc. announced revenue for the fourth quarter ended Jan. 31 of $10 million, compared with $4.3 million a year earlier. Quarterly profits were $2.2 million, or 32 cents per share, compared with $723,000, or 13 cents per share, a year ago.

■

Floating Point Systems, Inc. reported revenue for the first quarter ended Jan. 31 of $29.5 million, compared with $27.7 million one year ago. Profits for the quarter were $2.9 million, or 35 cents per share, compared with $3.2 million, or 39 cents per share, in the period a year ago.

Computer & Communications Technology Corp. announced fourth-quarter revenue of $13.8 million, compared with $27.4 million in the comparable period a year ago. The company reported a net loss of $10.3 million, or $1.33 per share, compared with a net income of $3.3 million, or 42 cents per share, in the like quarter a year ago.

■

Anacomp, Inc. reported net income for the first quarter of fiscal 1986 of $301,000, or 1 cent per share, on revenue of $28.3 million. This compares with a loss of $2.5 million, or 16 cents per share, on revenue of $31.5 million in the same quarter in the previous year.

■

Recognition Equipment, Inc. announced revenue for the quarter ended Jan. 31 of $54.1 million, compared with $37.9 million in the comparable period last year. Profits were $1.4 million, or 14 cents per share, compared with $2.1 million; or 17 cents per share, in the previous year.

■

Sanders Associates, Inc. reported revenue for the second quarter ended Jan. 24 of $220 million, compared with $230.1 million in the like period last year. Profits for the quarter were $8.7 million, or 44 cents per share, compared with $9.3 million, or 86 cents per share, a year earlier.

■

Nashua Corp. announced net income for the fourth quarter ended Dec. 31, of $5.5 million, or $1.17 per share, on revenue of $169.1 million. This compares with net income of $3.9 million, or 84 cents per share, on revenue of $148.3 million in the like period a year ago.

Vendors help stack the DEC

From page 114

Everyone, it seems, wants a piece of DEC.

One of the more interesting members of that group is AST Research, Inc., the Irvine, Calif., maker of microcomputer add-on boards. AST last week snapped up DEC memory add-on vendor Camintonn Corp. (see story page 112). In a sense, AST's move into the DEC world mirrors the principle upon which the firm was founded in a Santa Ana, Calif., garage in 1980.

Its three founders, two from Hong Kong and one from Pakistan, bet the business on the call that the IBM Personal Computer would be *the* place for technological enhancement products and all the subsequent layers of OEMs and value adders that would make the business boom.

Now, in a smaller but more sophisticated way, AST says it feels the same about DEC's lower end products. "We like to complement the strategy of the major players," AST cofounder Safi Qureshey (the "S" in AST) explains. "Connectivity is not just a PC issue or a minicomputer issue. There is always a need to connect."

Computer Industry section begins on page 114.

Qureshey says he feels that AST, via Camintonn, can become a major player in the DEC add-on business, where Emulex Corp. has been the dominant firm.

Emulex has had more than its share of patent infringement run-ins with DEC over the past year, but Qureshey predicts that DEC may be more willing to nurture its relationships with add-on companies now.

It's the old rule of thumb. When sales are slow, a company tends to guard jealously its business against third-party selling channels, clone or add-on vendors or even the resale of its products by its own customers — witness Sperry Corp.'s recent unbundling of its mainframe operating system software. But when business is good, it is well worth sacrificing a few current sales to cultivate a healthy value-added aftermarket.

That is where Qureshey says he feels DEC is quickly headed, and his enthusiasm is worth noting. Remember, AST aborted its PCjr peripheral line because it felt IBM had no clear niche in mind for the ill-fated box.

Such calls have enabled AST to increase its revenue tenfold in three years, and AST's presence on the DEC bandwagon is not a bad omen.

■

Industry watchers may be quick to interpret Zenith Data Systems, Inc.'s victory over IBM and AT&T for the Internal Revenue Service's laptop contract as David triumphing over Goliath. But in reality, it was Zenith who brought a real, proven system to the table — as well as a strong track record in government accounts. In that context, it was not such a great surprise that Zenith won out over a still-unannounced IBM product — despite what other computer trade publications may have erroneously reported.

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U.S. government to revise industrial classification codes

Change reflects moves in computer industry

By Mitch Betts

WASHINGTON, D.C. — The U.S. Office of Management and Budget (OMB) recently proposed plans to revise the government's Standard Industrial Classification (SIC) system to reflect changes in the computer industry.

The widely used, four-digit SIC codes have not been revised since 1977. They lump all sorts of computer statistics under broad categories, consequently masking specific industry trends.

The revised codes, slated to take effect in 1987, would create new, separate industry codes for many segments of the computer industry giving them higher visibility in government statistics.

The OMB said a technical panel recommended that the codes be updated by giving bigger industries their own codes and merging smaller ones into other categories. OMB said it is seeking public comments on the proposed revisions until April 15.

Manufacturers of electronic computing equipment (now 3573) would be broken down into five categories: computers (3571), computer storage devices (3572), computer terminals (3575), recording media (3695) and other computer peripheral equipment (3577).

Other changes recommended by the panel include the following:

- Computer programming and software services (7372) would be split into three categories: prepackaged computer software (3653), computer-integrated system design (7373) and custom computer programming services (7371).
- Data processing services (7374) would be split into three categories: electronic information retrieval services (7375), computer facilities management services (7376) and computer processing and data preparation services (7374).
- Radio and telephone services would be split, with telecommunications service companies getting a separate SIC code (4813). Communications equipment would be included in electronic parts and equipment (5065) rather than inelectrical apparatus. Modems would move from radio/television equipment to telephone/telegraph equipment (3661).
- Other computer-related services (7379) would be split into three categories: computer rental and leasing (7377), computer maintenance and repair (7378) and other computer-related services (7379).
- Computer and software stores would get their own SIC code (5734) instead of being classified along with radio and television stores.

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INDUSTRY NOTES

Tandon appeals ITC decision

Tandon Corp. will appeal the **International Trade Commission**'s (ITC) recent ruling that **Mitsubishi Electric Corp.** did not infringe upon Tandon's floppy-disk-drive patent.

The ITC had unanimously rejected the Tandon claim, noting that Mitsubishi's floppy-drive technology is fundamentally different from that covered by the Tandon patent.

■

Corvus Systems, Inc., struggling from financial woes, sold its **Onyx** line of 8-bit and 16-bit multiuser systems to **Megalogic, Inc.**, the **U.S.** subsidiary of **Micrologica Aplicada, SA**, a **Mexican** firm that has manufactured Onyx products in **Mexico** for two years. Micrologica will also distribute Corvus local-area networks and micro peripherals in Mexico. Terms were not disclosed.

■

Lotus Development Corp. will buy back 10% of its common stock, a move that could cost the company as much as $36.3 million. Lotus said it acted because the firm believes its stock is currently undervalued, but at least one analyst, **Broadview Associates' Harvey Poppel**, believes that the move may indicate Lotus is preparing to make another corporate acquisition.

■

Former **Schlumberger Ltd.** Chief Executive Officer **Pierre Schlumberger** died in **Paris** at age 71.

■

A **U.S. Bankruptcy Court** approved the reorganization plan of **Computer Devices, Inc.**

■

Sterling Software, Inc. completed the sale of its insurance systems unit to **Policy Management Systems Corp.**, the first of several divestitures Sterling said it will make to pay the $100 million debt it incurred in the acquisition of **Informatics General Corp.** last year.

■

Michigan loses $1.5 million as Down Under firm goes under

State's investment 25% of Attache's capital

By Edward Warner
Computerworld News Service

ANN ARBOR, Mich. — The latest victim of the microcomputer software shakeout is an unlikely venture capitalist: the state of Michigan, which recently lost an estimated $1.5 million in the ill-fated subsidiary of Australian personal computer software publisher Attache. Attache has gone out of business, taking with it an estimated total of $6 million in investors' money.

While David Turner, a senior analyst with the Michigan Department of Treasury, would only say the state had "considerable exposure in the company," one of the private investors in Attache's U.S. operation pegged the state's loss at one-fourth of Attache's U.S. capitalization. Michigan's Venture Capital Fund, a state agency responsible for encouraging high-tech development in Michigan, had provided "in the ballpark of 25%" of the investments in Attache with two rounds of financing, Turner acknowledged.

The state's money came from a $250 million pool of venture capital that is part of the state's $13 billion state employee pension fund, explained the Venture Capital Fund's director, Michael Finn. Finn called the loss "a drop in the bucket," and said it was not the Venture Capital Fund's first loss.

"We've had our losses, and we'll continue investing," he said. "In any venture capital program, you lose three out of 10 investments."

One of the lead investors in Attache's U.S. operation, Ian Bund, meanwhile, estimated that the U.S. operation's bankruptcy represents a total loss to investors of between $4 million and $6 million, depending on how much is earned from the sale of the U.S. operation's assets.

Computer Industry section begins on page 114.

In the U.S., Attache marketed an accounting program for the IBM Personal Computer called 2X2 Version Four. The software was one of the first packages to run under Microsoft Corp.'s Windows.

Bund, a partner in MBW Management of Ann Arbor, said Attache was unable to get widespread distribution for its software in the U.S. and closed the doors of its U.S. operation here about a week ago. MBW Management, an investment management fund, was one of the major investors in Attache's U.S. venture, Bund added.

According to a clerk at the U.S. Bankruptcy Court in Detroit, Attache's U.S. operation has not yet filed for liquidation or for protection from creditors under U.S. bankruptcy laws. The clerk, however, noted that no law requires a bankrupt firm to do so, although its creditors may petition the court to require such action.

To require Attache to file involuntarily for bankruptcy in federal court, at least three or more creditors must petition the court and put up a bond. So far, Bund said, none of the creditors appear prepared to put together the bond money.

Instead, investors are willing to pursue less formal means to recoup their losses, according to Bund, and they were encouraged by the "orderly wind-down in business" that occurred at Attache's U.S. operation prior to its liquidation, he added.

Fortune Systems posts yearly loss

BELMONT, Calif. — Fortune Systems Corp. last week announced its second straight yearly loss, losing $23.5 million, or $1.12 per share, in the year ended Dec. 31, 1985.

In 1984, the vendor of Unix-based multiuser office systems lost $21.9 million, or $1.02 per share. Annual revenue fell from $70.2 million in 1984 to $47.5 million.

Fourth-quarter revenue was $14.9 million, down from $18 million a year earlier, but was an 82% increase over third-quarter sales. Fortune Systems posted a fourth-quarter loss of $15.6 million, or 74 cents per share, including approximately $14 million in nonrecurring charges for downsizing the company. Charges included severance pay for employees laid off in November 1985 and January 1986 and write-downs on inventories, receivables, fixed assets and other assets. Since early 1985, Fortune has slashed its work force by nearly 50% to 275 employees.

In the fourth quarter of 1984, Fortune Systems posted a loss of $14.9 million, or 70 cents per share, which included significant write-downs.

"The microcomputer industry turmoil in 1985 taught everyone that revenue and profitability assumptions needed to be rethought," according to President and Chief Executive Officer James S. Campbell.

— Clinton Wilder

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Siemens AG, Sequent announce $50 million agreement

West German firm gets product rights

By Donna Raimondi

BEAVERTON, Ore. — Sequent Computer Systems, Inc. last week announced a $50 million OEM agreement with the West German firm Siemens AG.

Siemens, a $20 billion electronics company that makes power systems, factory automation equipment and various transaction processing and office automation systems, has both purchased Sequent products and acquired manufacturing rights to Sequent products. The two companies will exchange information and technologies, said Sequent's Chief Operating Officer Scott Gibson, but he would not comment on the nature of the exchange.

The West German company will buy the Sequent Balance 8000 parallel processing system, which includes from two to 12 32-bit microprocessors. According to Gibson, Sequent's recently released Balance 21000 system, which incorporates up to 30 processors, is not involved in the deal.

The agreement will boost the popularity and acceptance of parallel processing architectures, Gibson said. "When a $20 billion company decides to use parallel processing, that's news," he added. Siemens, which has not used parallel processing in its systems before, is said to be planning to use the architecture for OA and transaction processing applications. At present, most parallel processing systems are used in scientific — or number crunching — computing.

The move gives Sequent the credibility that it has sought since its inception, said Omri Serlin, an analyst at Itom International, a research and consulting firm in Los Altos, Calif. "They have had onesy-twosy sales for the most part, although their goal was always to become a major OEM supplier," Serlin said of the 3-year-old company. The agreement should solidify Sequent's lead in the parallel processing field against competitors like Flexible Computer Corp., he added.

Sequent's hardware and technology will be incorporated into new products from Siemens to be announced later, a Sequent spokeswoman said. The two companies have already been working on joint product development for several months and said that relationship will continue.

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Prime merges departments

NATICK, Mass. — Consolidating two departments into one, Prime Computer, Inc. last week announced the formation of a systems marketing and development department.

The department combines the product marketing department and the research and development organization.

Stephen Kiely, former corporate vice-president of R&D, will head the new department. The change comes after the resignation of nine-year Prime veteran Ian R. G. Edmonds, corporate vice-president of systems and product marketing, who left to pursue outside interests.

New vice-presidents

President and Chief Executive Officer Joe M. Henson also said that the new systems and marketing development organization will have two new vice-presidents.

Paul Jones, former senior director of I/O and communications, has been named vice-president of hardware development and will report to Kiely.

Ken Roy, former senior director of central systems, has been named vice-president of central systems and will report to Jones.

— Stanley Gibson

EXECUTIVE CORNER

Caddex Corp. has announced the appointment of **Hugo R. Cannizzaro** as president and chief executive officer. **Alan Higginson**, a founder and former president, has been promoted to chairman of the board. Cannizzaro's previous position was with Prime Computer, Inc. as vice-president of Western Operations.

■

CCX Network, Inc. has announced the appointment of **Phil Carter** as president. Prior to joining CCX, Carter had been with IBM. His most recent position there was as division director of Field Administration Operations at Montvale, N.J.

■

BKW Systems, Inc. announced the appointment of **Eugene J. White** as chairman and chief executive officer. **Alfred J. Fichera Jr.**, founder and former chairman, will now assume the position of president and chief operating officer.

■

Jerry Del Signore has been appointed to vice-president, Corporate Development, at Security Pacific Information Systems, Inc., where he will specialize in mergers and acquisitions. Previously, Del Signore directed the growth plans of AM International and Computer Sciences Corp.

■

Siemens Components, Inc. has announced the appointment of **Robert E. Caldwell** as senior vice-president and general manager of the newly created semiconductor group. Caldwell — who before coming to Siemens had been senior vice-president, engineering and technology, with Mostek, Inc. of Carrollton, Texas — will have the responsibility of unifying and building the semiconductor group through its three operating units.

■

John H. Curtis has been named executive vice-president and chief operating officer at Stratus Computer, Inc. Curtis joined Stratus in 1980 and served most recently as the company's vice-president of international sales. Previously he served Stratus as vice-president of finance and chief financial officer.

■

David V. Radlinski has been named to the position of vice-president of finance and chief financial officer for Printronix, Inc. Radlinski joined Printronix in 1984 as corporate controller.

■

Tandy Corp. has announced the appointment of **Richard L. Ramsey** to vice-president controller. Most recently Ramsey was vice-president, North American Manufacturing, at Tandy.

■

Ashton-Tate has announced the appointment of **David Russia** as vice-president, controller.

■

Prime Computer, Inc. has announced the appointment of **Brian F. Croxon** to vice-president of workstation programs within the company's computer-assisted design and manufacturing and workstations/terminals group. In this newly created position, Croxon will be responsible for developing and marketing a variety of workstations and terminals.

■

AT&T Bell Laboratories has announced the following appointments: **Joseph W. Timko** has been elected vice-president, AT&T Architecture; **Lee S. Tuomenoksa** has been named vice-president, Product Realization Planning and Engineering; and **William B. Smith** has been appointed executive director, Network Analysis and Technology.

■

Gandalf Technologies, Inc. has announced the following changes: **Gordon W. Gow**, formerly president of Gandalf Systems Group, becomes vice-president of new business development, a new position. He will be responsible for the operation of a business that Gandalf plans to operate separately from its principal data communications business.

Brian R. Hedges, vice-president for finance and treasurer in addition to his present responsibilities for the company's treasury, public financial reporting and investor relations, will be responsible for corporate planning and acquisitions.

James M. Bailey, formerly vice-president of manufacturing, becomes vice-president of operations with responsibility, in addition to worldwide manufacturing, for computer operations and communications, technical communications and operational control and administration of Gandalf's subsidiaries.

■

The American Federation of Information Processing Societies has announced the appointment of **John Clement** as director of governmental activities, a newly created position.

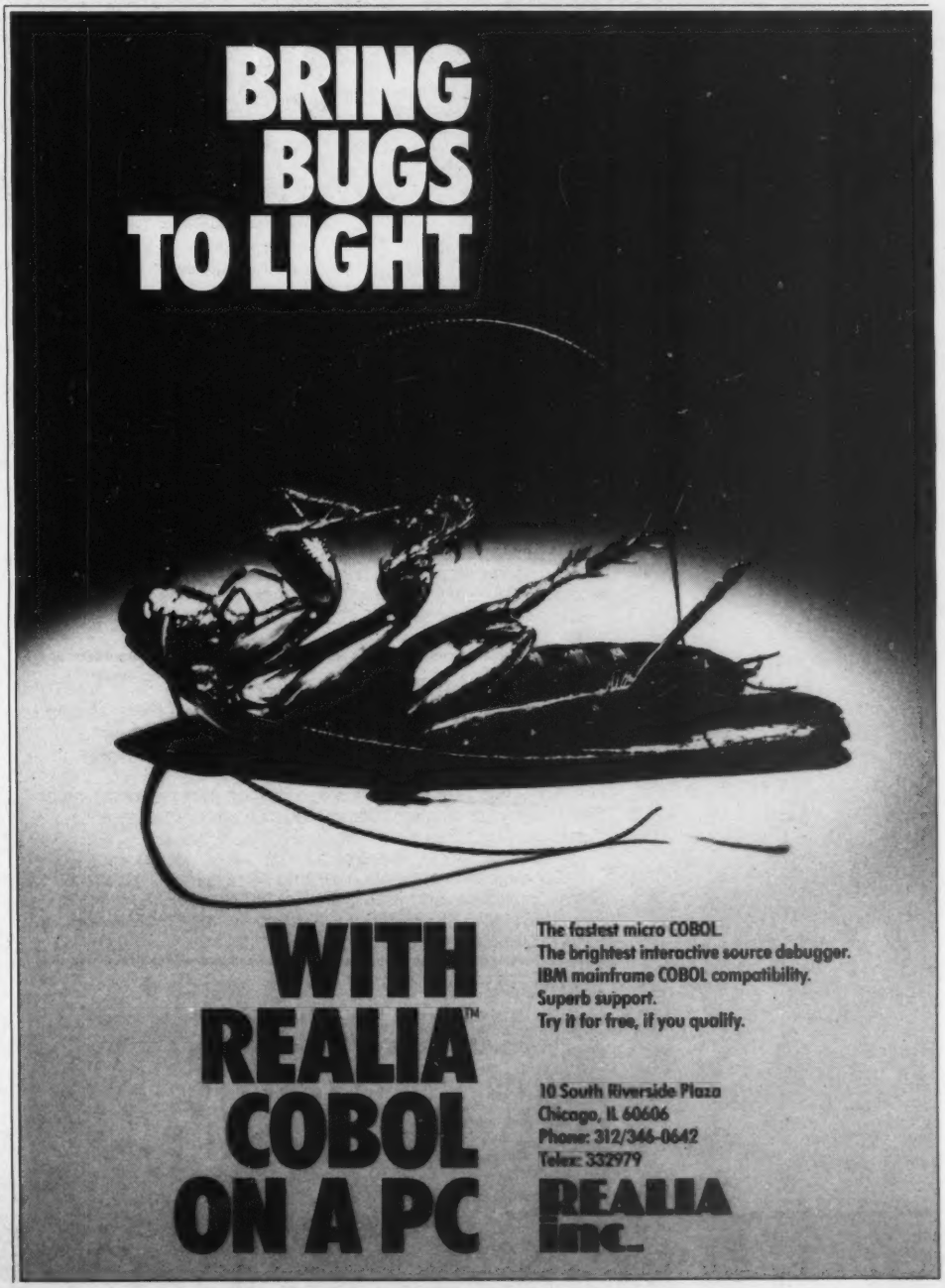
Memorex Corp. announced the appointment of **John Douglas** to the position of vice-president and general manager of its communications division.

■

RCA Corp. announced the appointment of **Eugene M. Stockton** as division vice-president and general manager of RCA's Automated Systems Division. The Automated Systems operation designs and manufactures a wide range of automatic test equipment, vehicle test equipment and command and control systems.

■

Uccel Corp. announced the appointment of **Michael G. Cocks** as corporate vice-president. Cocks serves as vice-president and general manager of Uccel's International Software division, with headquarters in London.



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They'll find the help they need in April's Computerworld Focus. Strategies for the present and the future. State-of-the-art products and technologies. Security. Vertical applications. Software. Plus networking and communications.

Then we'll zero in on micro storage.

April's special section takes a good, hard look at storage. We'll compare floppies to hard disks, 3-1/2" to 5-1/4" disks, and address issues of storage efficiency. So, in the end, our readers can make intelligent choices for their companies' applications.

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For more information, contact Ed Marecki, Vice President/Sales, Computerworld Focus, 375 Cochituate Rd., Framingham, MA 01701, (617) 879-0700. Or call your local Computerworld sales representative.

Issue: April 16 - Closing: March 7

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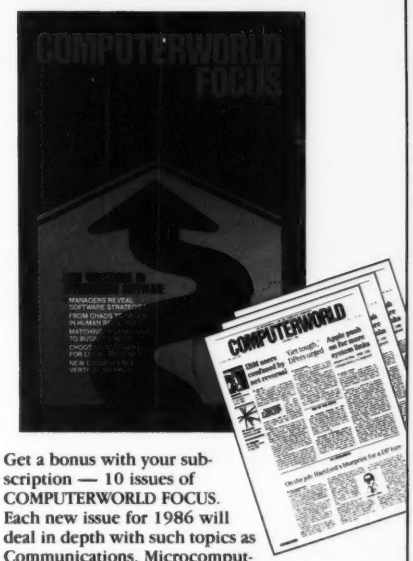

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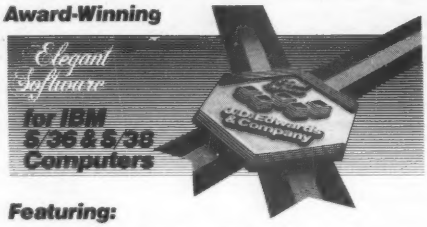

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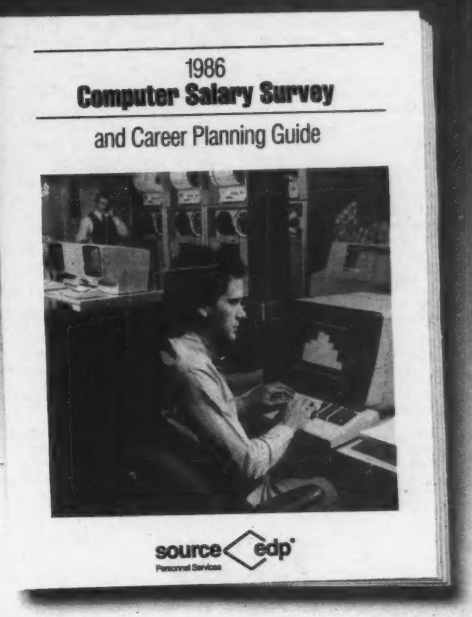

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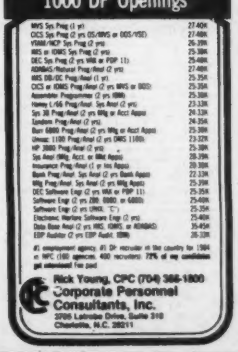

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RESEARCH PROGRAMMER
Small System Support (C-1)

Successful applicant will join a group providing technical support to innovative microcomputer-based projects funded as the result of an open campus competition. Relevant experience with the use of microcomputers or advanced workstations is a must. Knowledge of hardware, experience with advanced graphics, networking, or laboratory data collection in a microcomputer environment, or experience writing microcomputer applications or device drivers is a definite plus. Full or part time. **Salary Range:** $25,000 - $35,000. **Starting date:** flexible.

RESEARCH PROGRAMMER
(Systems Programmer) - IBM VM/CMS Support (A-2)

Successful applicant will join a group responsible for installing and maintaining an expanding base of VM systems. Duties of the group include all aspects of selecting and installing system software; installing and modifying applications packages; configuring hardware and communications gear; and developing procedures for operations. This is a full-time position. **Salary Range:** $25,000 - $40,000. **Starting date:** flexible.

In order to ensure full consideration, applications for either position must be received by March 14, 1986. Send applications to **Joyce McCabe, University of Illinois, 150 Digital Computer Lab., 1304 W. Springfield, Urbana, IL 61801. Phone (217) 333-1637.**

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Senior
Software Systems Analyst

Applications are being accepted for Senior Software Systems Analyst, UNS Computing Center, Reno, Nevada. Responsibilities include: under supervision, evaluate, install, modify, test, document, develop and maintain computer software on CDC mainframe computers. Initial responsibilities will be in support of business oriented language compilers and utilities. Requires a minimum of a Bachelors Degree, good communication skills, both oral and written, ability to work with diverse individuals in a tactful, productive manner, four years full time equivalent experience in administrative data processing or computer systems software analysis and programming, and in-depth knowledge of two or more computer languages. Salary: $27,161 to $31,745. Application deadline: April 3, 1986. Send letter of application, resume, and the name, address, and telephone number of at least three professional references to: **Christopher R. Geuls, UNS Computing Center, University Of Nevada, Reno, Nevada 89557-0023.** The University of Nevada system is an Equal Opportunity/Affirmative Action Employer.

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AST buys into memory mart

Camintonn acquisition rounds out product line

By Peggy Watt

IRVINE, Calif. — AST Research, Inc.'s jump into the world of Digital Equipment Corp. memory products is an appropriate way for the firm to round out its product line and compete in a crowded market, said those who watched Camintonn Corp. join the AST camp last week.

AST announced the acquisition of Santa Ana, Calif.-based Camintonn, which makes memory management products for DEC's Q-Bus, Microvax II, VAX 11/730 and 11/750 computer systems and communications interfaces for the Q-Bus. Camintonn also has an OEM contract with DEC for PDP-11 memory systems.

Products from the Camintonn purchase become the third prong of AST's family of memory and expansion boards, which currently includes boards for the IBM Personal Computer and the Apple Computer, Inc. Macintosh.

Founded in 1981 by John Tu, David Sun and David Tang, Camintonn is only a year younger than AST. The privately held company, estimated at $7 million, has 14 employees — all of whom will move to AST at Irvine. All three engineer/founders are still involved, and Tu will remain as head of the firm, reporting to Thomas Yuen, AST executive vice-president.

AST has been eyeing the Microvax market and planning to diversify for some time, according to Bruce Edwards, AST vice-president for finance. He said the company was reluctant to start from scratch and earmarked its second public offering, which raised $13 million in May, for acquisition.

AST is interested in larger systems partly because of industry focus on connectivity. AST wants to link DEC equipment with both IBM and Apple systems, said Wai S. Szeto, new product director and one of AST's liaisons to Camintonn.

'We'd like to connect all of them'

"We've been talking about gateway products," Szeto said. "One day we'd like to connect all of them."

Camintonn's first products under the AST umbrella will also appear this year, including memory boards for the PDP 11/84, VAX 11/780 and VAX 8600, as well as a VMEbus and more communications interfaces, company officials said.

AST plans to retain Camintonn's name on its products and add only the phrase, "An AST Research Company."

Tandon charged in joint patent suit

LOS ANGELES — Sanders Associates, Inc. of Nashua, N.H., has filed a suit against disk drive manufacturer Tandon Corp. of Chatsworth, Calif., seeking past royalties on its dual-sided floppy disk drives.

Filed last week in Los Angeles District Court by Sanders and Hydrogen Energy Corp. of Kansas City, Mo., the suit claims that the technology for the dual-sided floppy disk drives was jointly created by employees of California Computer Products, Inc. of Anaheim, Calif.

In the late 1970s, California Computer Products was sold to Sanders and Hydrogen Energy subsidiary, Billings Computer Co.

The suit claims that Tandon owns only a portion of the dual-sided floppy disk patent in conjunction with Sanders Associates and Hydrogen Energy.

— Maura McEnaney

IBM review at standstill

From page 114

to report since it began a year ago," says spokesman Lyle Maguire. "But the Justice Department did not put a deadline on it."

A major reorganization at the Justice Department last fall is primarily responsible for the slowness of the Consent Decree review, sources say. Formerly under the auspices of the department's intellectual properties unit, the review was transferred to the communications and finance section as the department consolidated nine former units into five.

Regardless of the eventual outcome of the case, most observers say they feel that IBM is not likely to return to certain pre-Consent Decree business practices. Because IBM derives only about 10% of its hardware revenue from leased equipment, it is doubtful that the company would reinstitute its lease-only policy.

"That's a dead letter; market competition would dictate that IBM would keep selling," says MIT economics professor Franklin M. Fisher, author of a 1983 book on federal antitrust action against IBM.

IBM observer Bob Djurdjevic, president of Annex Research in Phoenix, says that IBM wants to remove the potential threat of antitrust action, particularly regarding its software licensing terms.

"Thirty years later, the software terms are essentially equivalent to lease only," Djurdjevic says. "They have a lump payment that implies it's a purchase, but it's not so. The title and ownership rights still remain with IBM. That could be viewed as violating the Consent Decree."

But such gray areas are not likely to spur the Justice Department into a quick review, says Joe Sims, a Washington, D.C., attorney and former deputy assistant attorney general in the department.

"Conceptually, department officials are generally quite open to these things, but they're not high-priority items," Simms says. IBM's interest may be more in cleaning up the books than anything else, and if the department perceives that, it wouldn't be a priority item."

Public offerings present temptation for investors

ACTIVE ISSUES
Kathy Porteus

The opportunity to be among the first to invest in highly promising companies becomes particularly tempting when firms with established track records, such as Microsoft Corp. and Sun Microsystems, Inc., file their initial public offerings (IPO).

According to leading underwriters of high-technology companies, Microsoft and Sun are just two of many "seasoned" technology firms that are going public during the next several months.

Stimulating IPO activity is the strong stock market in which technology issues have regained popularity among institutional investors. This receptive environment prompts mature companies to go public because the value they attach to themselves can match the initial offering price investors are willing to pay.

Activity in initial technology offerings is currently so brisk that some investors have begun speculating whether 1986's IPO market will achieve the notoriety of 1983's bull market for technology public offerings. In 1983, investor euphoria for high-tech stocks enabled many fundamentally weak companies to go public at premium prices.

According to underwriters, 1983's "early harvesting" of young technology companies created a void in IPO activity for the next two years. But underwriters maintain that the emotions that swept over 1983 should not recur in 1986 because today's public offering market is marked by mature, high-quality firms. "Such selectivity in technology offerings should continue," says Christopher Covington, director of corporate finance with Robertson, Colman & Stephens, because investors are "still looking for numbers not concepts."

Richard Franyo, director of corporate finance with Alex Brown & Sons, concurs. "I'm not sure the wounds from 1983 have healed," he says, "so I think investors will be cautious and buy new issues of quality technology companies at properly priced deals."

Not everyone, however, agrees with that outlook. Mason Slaine, president of Dealers' Digest, Inc., which publishes the weekly newsletter "Going Public: The IPO Reporter," says he believes "in a month or two, the high-tech IPO market will become much hotter than it is now. Because of this, we will again see the poor quality offerings of 1983."

What will finally determine the health of this year's public offering market is how well the stock market and technology offerings will perform over the next months. This is one reason all eyes focus on the public offerings of Microsoft and Sun.

According to Robert Natale, editor of Standard & Poor's "Emerging and Special Situations" investment service, Microsoft's issue, expected to be priced between $16 and $19, is reasonably priced and strengthened by the company's impressive margins, broad product line and growth prospects. Both Natale and Slaine of Dealers' Digest say Sun's recent margin pressures and increasingly competitive environment do not justify an initial offering price of 55 times earnings. "I think Sun will be a trading vehicle," Natale adds.

But "Value Line New Issues Service," an IPO-tracking publication, currently recommends both Microsoft and Sun for purchase.

Public offering investment services and underwriters agree on at least one thing: Individual investors should proceed with utmost caution.

Because institutions dominate 70% to 80% of the market, Covington of Robertson Colman says the best an individual can hope to do is "steal yourself to volatility." Another underwriter suggests participating in public offerings via mutual funds.

"If I were to advise any individual," Slaine warns, "I'd say stay away."

Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized research services for financial and high-tech firms.

Lessors try to change habits

From page 114

But corporate users, to this point, still prefer to buy their micros outright. "When you compare it with a lease price, a new microcomputer is not that expensive, the payback is fairly quick, and prices are still coming down," says Roy Hill, chief systems programmer for Detroit-based Blue Cross & Blue Shield of Michigan. Hill says that the $70 to $100 per month that the Farah Group charges to lease computers sounds like a low price but that is because the products are non-IBM.

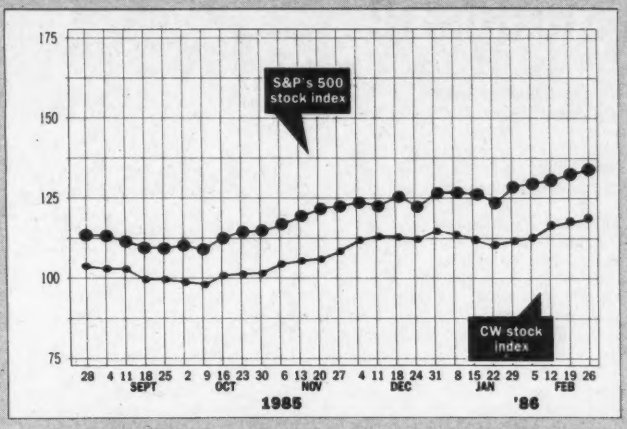
Unlike major corporations, many small businesses lease micros because of the low initial cost. "Usually they lease because there is no down payment, or it is minimal, and they can write it all off. They don't tie up their money," says Howard Lefkowitz, president of retail dealer HLA Computers, Inc. of Beltsville, Md.

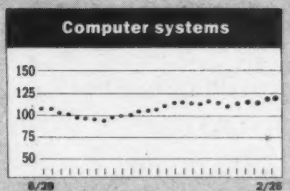
According to a Future Computing, Inc. survey done last year, 37% of microcomputer dealers already offer some form of leasing, and that list includes such heavyweights as Computerland Corp., Entre Computer Centers and Microage.

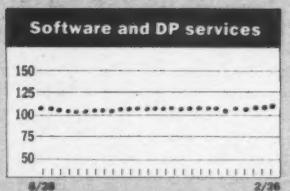
COMPUTER INDUSTRY

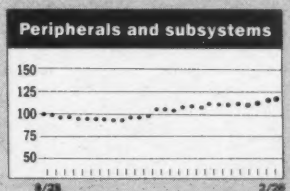
MITCHELL J. HAYES

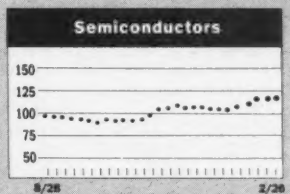
Computerworld stock trading index

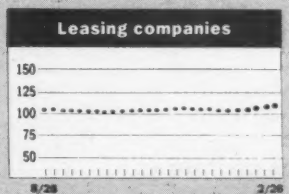












All indexes reflect a historical base of 100 on Dec. 31, 1984, and trace stock market performance in relation to that base. The CW stock index represents the unweighted average performance of the six categories of computer industry stocks.

	2/19/86	2/26/86
Computer systems	119.1	**119.7**
Software and DP services	104.4	**104.5**
Peripherals and subsystems	112.2	**114.5**
Supplies and accessories	145.1	**144.4**
Semiconductors	110.8	**111.8**
Leasing companies	103.0	**103.5**
CW stock index	115.8	**116.4**
Standard and Poor's 500 stock index	131.0	**134.0**

Computerworld stock trading summary

CLOSING PRICES WEDNESDAY, FEBRUARY 26, 1986

COMPUTER SYSTEMS

EXCH		PRICE 52-WEEK RANGE (1)		CLOSE FEB 26 1986	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALPHA MICROSYSTEMS	5-	9	6	0	0.0
O	ALTOS COMPUTER SYST	9-	17	16 7/8	+1 1/8	+7.1
A	AMDAHL CORP	10-	18	16 5/8	+1/2	+3.1
O	APOLLO COMPUTER	9-	31	15 7/8	-1 1/8	-6.6
O	APPLE COMPUTER INC	14-	31	26	+1	+4.0
N	AT&T	19-	28	22 1/4	+1	+4.7
N	BURROUGHS CORP	52-	71	70 1/4	-5/8	-0.8
O	COMPAQ COMPUTER CP	5-	16	15 7/8	+2 3/8	+17.5
O	COMPUTER AUTOMATION	1-	9	2 3/4	+3/8	+15.7
A	COMPUTER CONSOLES	5-	14	5 3/4	-5/8	-9.8
N	CONTROL DATA CORP	15-	39	24 1/8	+7/8	+3.7
O	CONVERGENT TECHNOL	5-	13	10 5/8	-1 1/4	-10.5
O	CPT CORP	5-	8	5 7/8	-3/8	-6.0
N	CRAY RESEARCH INC	25-	72	71 3/4	+3	+4.3
O	DAISY SYSTEMS CORP	12-	38	11 3/4	-5 1/2	-31.8
N	DATA GENERAL CORP	31-	76	42 1/4	-3 1/8	-6.8
N	DATAPOINT CORP	5-	22	5 1/4	0	0.0
N	DIGITAL EQUIPMENT	85-	167	166 3/4	+6 1/2	+4.0
A	EECO INC	13-	16	14 3/8	+1/4	+1.7
N	ELECTRONIC ASSOC.	3-	6	4 3/8	0	0.0
N	FLOATING POINT SYST	18-	37	31	-1 1/2	-4.6
N	FOXBORO	22-	31	24 3/4	+1/8	+0.5
N	GOULD INC	20-	38	28 3/4	+5/8	+2.2
N	HARRIS CORP	22-	35	30 3/4	+7/8	+2.9
N	HEWLETT-PACKARD CO	29-	43	41 3/4	-1 5/8	-3.7
N	HONEYWELL INC	54-	87	78 3/8	-1 7/8	-2.3
N	IBM	117-	158	158 1/4	+3/4	+0.4
O	IPL SYSTEMS INC	1-	4	1 5/8	0	0.0
N	ITT CORP	28-	44	44	+3	+7.3
N	M/A-COM INC	13-	24	15 3/4	+1/2	+3.2
N	MANAGEMENT ASSIST	2-	28	2 1/8	0	0.0
N	MATSUSHITA ELEC(ADR)	49-	71	65 5/8	-3/8	-0.5
O	MENTOR GRAPHICS	13-	30	17 1/8	-1 7/8	-9.8
N	MODULAR COMPUTER SYS	6-	8	8 5/8	+1/8	+1.9
N	MOHAWK DATA SCI	1-	13	2 3/8	+1/4	+11.7
N	NBI INC	11-	20	12 1/4	-1/8	-1.0
N	NCR	25-	46	43 7/8	-1 3/4	-3.8
N	PERKIN-ELMER	22-	38	34 3/4	-7/8	-2.4
N	PRIME COMPUTER INC	15-	27	25 7/8	-3/4	-2.8
N	SPERRY CORP	39-	59	53 1/2	+1	+1.9
O	STRATUS COMPUTER INC	9-	25	21 1/4	+2 3/8	+12.5
O	TANDEM COMPUTERS INC	13-	29	23 7/8	-1 1/2	-5.9
N	TANDY CORP	24-	42	40 7/8	+5/8	+1.5
O	TELEVIDEO SYSTEMS	2-	4	3 3/4	+1/8	+3.4
O	TELXON CORP	10-	27	25 3/4	-1 1/2	-5.5
N	TEXAS INSTRUMENTS	86-	132	126 7/8	+2 1/8	+1.7
A	ULTIMATE CORP	8-	30	30 1/8	+2 1/8	+7.5
O	VECTOR GRAPHICS INC	1-	1	1/8	0	0.0
A	WANG LABS "B"	15-	29	20 3/8	+3/4	+3.8
A	WANG LABS "C"	15-	29	20 5/8	+1	+5.0
N	XEROX CORP	37-	70	69 5/8	+1 7/8	+2.7

SUPPLIES & ACCESSORIES

N	AMERICAN BUS PRODS	21-	35	30 1/2	-1 7/8	-5.7
N	BARRY WRIGHT	17-	29	21 1/4	+1/4	+1.1
A	DUPLEX PRODUCTS INC	13-	22	21 1/8	-1/8	-0.5
N	ENNIS BUS. FORMS	14-	26	26 3/8	+3/8	+1.4
N	3M COMPANY	74-	98	95 5/8	-2 5/8	-2.6
N	MOORE CORP LTD	15-	23	22 1/2	+1/4	+1.1
O	STANDARD REGISTER	22-	39	37 1/4	+3/4	+2.0
N	WALLACE COMP SERVICE	30-	45	44 1/4	0	0.0

SOFTWARE & DP SERVICES

O	ADVANCED COMP TECH	2-	5	4 1/2	-1/2	-10.0
N	ADVANCED SYSTEMS INC	9-	20	20	+7/8	+4.5
N	AGS COMPUTERS INC	10-	25	23 1/2	-1 1/2	-6.0
O	AMERICAN SOFTWARE	9-	15	9 1/8	+1/8	+1.3
N	ANACOMP INC	2-	4	4 3/8	+3/4	+20.6
O	ANALYSTS INTL CORP	5-	11	5 1/4	-3/8	-6.6
O	ASHTON TATE	6-	23	23	+1/2	+2.2
O	ASK COMPUTER SYSTEMS	7-	25	14	0	0.0
B	ASTRADYNE COMP IND	1-	3	1 3/4	-1/4	-12.5
N	AUTOMATIC DATA PROC	35-	66	65 1/8	-1	-1.5
O	COMPUTER NETWORK	5-	9	5 1/8	-5/8	-10.8
O	COMPUTER ASSOC INT'L	18-	37	37	+1	+2.7
O	COMPUTER HORIZONS	5-	12	12 1/4	+1 1/2	+13.9
N	COMPUTER SCIENCES	13-	36	35 7/8	+3 5/8	+11.2
O	COMPUTER TASK GROUP	10-	26	25 1/2	+3/4	+3.0
O	COMPUTER USAGE	1-	3	1 5/8	0	0.0
O	COMPUTONE SYSTEMS	4-	11	3 7/8	-3/8	-8.8
O	COMSERV CORP	1-	6	3 1/2	0	0.0
O	COMSHARE	7-	12	10 5/8	+1/8	+1.1
N	CULLINET SOFTWARE	13-	33	14 5/8	-1 5/8	-10.0
O	CYCARE SYSTEMS INC	19-	27	23 1/2	+2 3/4	+13.2
O	HOGAN SYSTEM INC	4-	12	7 1/2	-7/8	-10.4
N	GENERAL ELECTRIC CO	56-	76	75 1/2	+1/2	+0.6
N	GENL MOTORS E (EDS)	20-	47	38 7/8	-1 1/8	-2.8
N	GTE CORP	38-	50	49	-1/4	-0.5
O	INFORMATION SCIENCE	1-	5	3	-1/4	-7.6
O	INFOTRON SYSTEMS CP	13-	24	18	0	0.0
O	KEANE ASSOCIATES	10-	20	12 3/4	0	0.0
N	LOGICON	25-	43	37 1/8	+3	+8.7
O	LOTUS DEVELOPMENT CP	15-	34	24	-1/4	-1.0
O	MCI COMMUNICATIONS	7-	13	12 7/8	0	0.0
O	MINGT SCI AMER INC	7-	16	12 7/8	+1/8	+0.9
O	MATHEMATICAL APP GRP	1-	8	1 7/8	+1/8	+7.1
O	MICOM SYSTEMS INC	12-	35	19	+1/4	+1.3
O	MICROPRO INT'L CP	2-	4	2	0	0.0
O	NATIONAL DATA CORP	8-	19	18 7/8	0	0.0
O	ON-LINE SOFTWARE INT	4-	11	10	0	0.0
N	PANSOPHIC SYSTEMS	14-	30	29 3/4	+1 1/8	+3.9
N	PLANNING RESEARCH	11-	19	15 7/8	-1 3/8	-7.9
O	POLICY MGMT SYSTS CP	16-	35	16	-1	-5.8
O	PROGRAMMING & SYS	4-	9	9	+1 1/4	+16.1
O	REYNOLDS & REYNOLD	31-	60	60	+1 1/2	+2.5
O	SEI CORP	13-	27	26 3/4	+2 1/2	+10.3
O	SHARED MEDICAL SYST	26-	37	35 1/8	-2 1/8	-5.7
O	SCIENTIFIC COMPUTERS	5-	8	5 1/8	0	0.0
O	SOFTWARE AG	12-	22	18 3/8	-1 1/4	-6.3
N	IRS CORP	10-	14	14 1/8	+2 1/8	+17.7
N	UCCEL	11-	18	18	0	0.0
O	VM SOFTWARE	17-	24	20 1/4	-1	-4.7

SEMICONDUCTORS

N	ADVANCED MICRO DEV	22-	36	31 1/4	-1/2	-1.5
O	ADV'D SEMICONDUCTOR	7-	23	13 1/2	+2	+17.3
N	ANALOG DEVICES INC.	18-	31	28 1/2	-2	-6.5
O	ANALOGIC CORP	11-	16	13 5/8	-1	-6.8
O	APPLIED MAGNETICS CP	9-	18	18	+1	+5.8
O	AVANTEK	18-	26	19 5/8	+1/8	+0.6
O	HADCO CORP	3-	7	5	+1/4	+5.2
O	INTEL CORP	21-	33	28 1/4	0	0.0
O	MICRO MASK INC	6-	12	6 5/8	0	0.0
N	MOTOROLA INC	29-	45	43 1/2	-1 1/8	-2.5
N	NAT'L SEMICONDUCTOR	10-	15	14 1/4	0	0.0
N	TERADYNE	17-	33	26	-1/4	-0.9

PERIPHERALS & SUBSYSTEMS

P	AM INTERNATIONAL	3-	8	7 1/2	+3/8	+5.2
A	ANDERSON JACOBSON	2-	5	2 1/8	0	0.0
O	AST RESEARCH INC	7-	33	26 1/2	+7/8	+3.4
O	AUTO-TROL TECHNOLOGY	3-	13	6	+1 5/8	+37.1
O	AVANT-GARDE COMPUTNG	3-	21	5	-1/4	-4.7
O	BANCTEC INC	6-	12	7 7/8	-3/8	-4.5
O	BEEHIVE INT'L	1-	2	1/8	0	0.0
N	BOLT,BERANEK & NEW	20-	39	39	+2	+5.4
O	CAMBEX CORP	1-	3	1 1/4	-1/8	-8.6
N	CENTRONICS DATA COMP	3-	11	5 1/2	+5/8	+12.8
A	CETEC CORP	6-	9	7 1/4	-1/8	-1.6
A	COGNITRONICS	4-	7	4	0	0.0
N	COMPUGRAPHIC CORP	23-	36	23 3/4	+1/8	+0.5
O	COMPUTER TRANSCEIVER	0-	1	5/8	+1/4	+57.0
N	COMPUTERVISION CORP	9-	44	14 1/2	-3/8	-2.5
N	CONRAC CORP	12-	18	16 1/2	-1 1/4	-7.0
A	DATAPRODUCTS CORP	11-	20	15 1/2	-1/8	-0.7
A	DATARAM CORP	4-	12	11 7/8	+5/8	+5.5
O	DATA SWITCH CORP	4-	9	5 1/4	+1/8	+2.4
O	DATUM INC	5-	9	5 1/8	-1/4	-4.6
O	DECISION DATA COMPUT	10-	20	10	-1 1/4	-11.1
O	ENDATA, INC	2-	8	5 7/8	+3/4	+14.6
O	EVANS & SUTHERLAND	12-	23	23 1/4	+3/4	+3.3
O	GANDALF TECHNOLOGIES	5-	13	6 3/8	-1/4	-3.7
N	GEN'L DATA COMM IND	8-	21	12 1/8	-3/8	-3.0
N	HAZELTINE CORP	20-	30	19 5/8	-1/4	-1.2
O	ICOT CORP	3-	11	10 3/4	-3/8	-3.3
O	INFORMATION INTL INC	10-	17	13 1/4	+1/4	+1.9
O	INTECOM INC	4-	11	4 3/8	+1/8	+2.9
A	LUNDY ELECTRONICS	10-	15	14 3/8	+1/4	+1.7
O	MEGADATA CORP	3-	8	3 3/8	-1/16	-1.7
A	MSI DATA CORP	7-	13	11 7/8	+1 3/8	+13.0
N	NASHUA CORP	24-	39	38 3/4	+1 3/8	+3.6
O	NETWORK SYSTEMS CORP	11-	27	11 1/4	-2 3/8	-17.4
N	NO AMERICAN PHILIPS	32-	45	42 1/2	+1/4	+0.5
N	NORTHERN TELECOM LTD	26-	41	28 1/8	+1/2	+1.8
O	OMEX	1-	3	1/2	0	0.0
N	PARADYNE CORP	6-	18	7	0	0.0
A	PENRIL CORP	7-	14	8 1/4	-1/4	-2.9
N	PLESSEY CO (ADR)	19-	30	29 1/2	+1/4	+0.8
O	PRINTRONIX INC	9-	18	13 1/8	+5/8	+5.0
O	QMS INC	6-	16	10 3/8	-7/8	-7
O	RAMTEK CORP	2-	7	3 1/2	0	0.0
N	RECOGNITION EQUIP	9-	17	13 5/8	+1/2	+3.8
N	SANDERS ASSOCIATES	30-	44	40 1/2	+3 3/8	+9.0
O	SCAN-TRON CORP	9-	19	18 3/4	+1/2	+2.7
N	SCIENTIFIC ATLANTA	10-	15	14	+1	+7.6
O	SEAGATE TECHNOLOGY	5-	10	9 1/2	+1/8	+1.3
N	STORAGE TECHNOLOGY	1-	4	3 1/4	-1/4	-7.1
O	SYKES DATATRONICS	0-	2	3/8	+1/16	+7.8
A	T BAR INC	5-	9	5 1/2	+1/4	+4.7
A	TAB PRODUCTS CO	14-	21	20 3/8	-1/4	-1.2
O	TANDON CORP	3-	9	5 5/8	+5/8	+12.5
A	TEC INC	6-	13	5 7/8	-1/8	-2.0
N	TEKTRONIX INC	47-	68	63 1/8	+5/8	+0.9
N	TELEX	34-	68	67 5/8	+2 3/8	+3.6
O	TESDATA SYSTEMS CP	0-	3	3/4	-1/8	-14.2
N	TIMEPLEX INC	15-	23	16 1/2	+1 1/8	+7.3
N	TYMAN CORP	4-	11	10 7/8	+1/4	+2.2
O	VISUAL TECHNOLOGY	1-	3	7/8	+1/16	+7.6

LEASING COMPANIES

N	COMDISCO INC	10-	29	28 3/8	+1/2	+1.7
N	CONTINENTAL INFO SYS	5-	18	18	+1 1/2	+9.0
O	FINALCO GROUP INC	4-	5	4 1/2	+1/4	+5.8
O	PHOENIX AMERICAN INC	2-	4	3 7/8	+1/4	+6.8
O	SELECTERM INC	7-	12	6 1/2	0	0.0
N	U.S. LEASING	32-	43	38 5/8	+7/8	+2.3

EXCH: N—NEW YORK; A—AMERICAN; P—PACIFIC; B—BOSTON; L—NATIONAL; M—MIDWEST; O—OVER-THE-COUNTER

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Source: Trade Quotes, Inc.

COMPUTER INDUSTRY

INSIDE

AT&T Chairman Charles Brown tells stockholders he will retire this year/**90**

Datapoint reports an $8.4 million second-quarter loss/**92**

The state of Michigan loses venture capital in a failed software start-up/**95**

Individual investors should be wary of the red-hot initial public offering market/**112**

INSTANT ANALYSIS

"We're not interested in being a home computer company. I haven't seen anybody make any money, since I've been in the industry, as a home computer maker."

— John Sculley, chairman, chief executive officer and president of Apple Computer, Inc.

IBM review at a standstill

Thirty-year-old Consent Decree remains in effect

By Clinton Wilder

In the year since IBM acknowledged its attempt to have various antitrust restrictions on its business removed [CW, March 11], a bureaucratic reorganization in the U.S. Department of Justice has virtually halted the review process. However, both the Justice Department and IBM stress that, despite the lack of activity to date in reviewing the 1956 Consent Decree, the inquiry remains open.

"There has been no decision to close that inquiry," says Kevin Sullivan of the Justice Department's Antitrust Division. "We may move slowly on things, but we don't simply drop something without conveying that to the parties. Other than that, I can't discuss it because it is still under inquiry."

IBM's effort to be freed from provisions of the Consent Decree has been strongly opposed by the Computer Dealers and Lessors Association (CDLA). The group feels that independent leasing firms could be jeopardized if IBM were not required to cooperate with third-party firms in areas such as parts availability and customer support.

Top CDLA officials declined to comment on the Justice Department review, but leasing firms say that, for the moment, lack of action by the department is as good as a decision against IBM. "Basically, no news is good news," says Paul Fish, lead counsel for independent leasing industry leader Comdisco, Inc. "IBM continues to be bound by the decree. This case is not a high priority, as far as I know. But those things can change, obviously."

"The general consensus in the industry is that it's a dead issue right now," says Robert Bardagy, Comdisco's senior vice-president of marketing. "It has been in a perpetual limbo state."

IBM agrees that the review has been essentially dormant. "We have nothing more

See **IBM** page 112

Micro leasing companies try to change old market buying habits

By Douglas Barney

The concept of microcomputer leasing has yet to take off in corporate America, which still prefers the outright purchase of micros that are steadily declining in price. But both large and small leasing companies are trying to change that.

Seeking to apply the principles that have made mainframe leasing successful, leasing companies such as ITT Commercial Finance Corp. continue to push the leasing option, and a new entrant, the Farah Group, Inc., is willing to invest up to $5 million per month to get its micro lease program off the ground.

Marlton, N.J.-based Farah, along with its affiliate, SGC Marketing, Inc. of Toronto is now offering a program called Lease Plus to computer dealers in the U.S. and Canada. "We see signing up 1,000 dealers in 1986," says Joe Chirco, president of Farah. So far, Farah has signed agreements to offer NCR Corp. and Ing. C. Olivetti & Co. SpA micros for lease and is negotiating with other vendors.

But in addition to facing heavy competition from the likes of ITT Commercial Finance and others, Farah must overcome the reluctance of major corporations to lease microcomputers if it is to crack the corporate market.

ITT is not sitting still, either. It is attempting to use its position as the leading financier of computer dealers' inventory to reach national leasing agreements with IBM and Compaq Computer Corp. "We are attempting to enter that arena with them, but that is a selling job on our part," says Ronald Worrell, division vice-president for ITT Commercial Finance's Fast Forward Leasing Division.

See **LESSORS** page 112

INDUSTRY INSIGHT
Clinton Wilder

Vendors help stack the DEC

The Digital Equipment Corp. bandwagon is getting more crowded by the week.

Long a media whipping boy for its lack of marketing focus, personal computer debacle and reluctance to hook into the IBM world, DEC seems to be making new friends all the time in the journalistic, financial and computer industry communities, with its stock price rising accordingly. For the reasons behind this phenomenon, one need look no farther than the Decworld exhibit halls of three Boston hotels last week or the pages of the trade press for the last few months.

The proof, as they say, is in the products.

The advantages of DEC's well-timed (or perhaps just fortuitously timed) new product cycle, coming on the heels of industry-slump cost-cutting, have been well documented in financial analysts' reports. "Well positioned for continued solid growth" has lately become almost a DEC cliche — one that any major computer maker would love to share.

Even *Barron's*, the financial weekly not noted for singing corporate praises, has advised (or at least quoted others' advising) its readers to be "fully invested" in the Ken Olsen empire. And *The Boston Globe*, which has been far from Olsen's best friend in recent years, is waxing lavish about how Decworld fills every high-ticket hotel room in town, fulfilling "a major goal of the Greater Boston Convention and Tourism Bureau."

See **VENDORS** page 93

Wilder is Computerworld's *senior editor, computer industry.*

Peachtree Software hopes it has weathered the storm

Company tries to regain accounting market lead

By James A. Martin

NORCROSS, Ga. — After a lengthy period marked by layoffs, realigned marketing strategies and discontinued products, Peachtree Software, Inc. is attempting to position itself for a return to its days as a leading microcomputer accounting software vendor for small businesses.

"Peachtree Software is alive and well in Norcross," says J. William Goodhew III, president of the former Management Science America, Inc. (MSA) subsidiary that is now an Intelligent Systems Corp. company. "We have several new products under way now that we'll be announcing at spring Comdex and then some more later on in the year. I feel like we are doing the right things, even though the process is frustratingly slow."

J. William Goodhew, Peachtree president

After developing a widely diversified micro product line under MSA, Peachtree now markets just four programs — two accounting packages and two productivity aids. "We would like to be to small business accounting what Lotus Development Corp. 1-2-3 is to spreadsheets," Goodhew says.

Mainframe software vendor MSA announced plans to divest itself of its 3-year-old Peachtree micro software division in October 1984. At the time, MSA said that some $10 million of the company's $12 million year-to-date operating losses were directly attributed to Peachtree. The micro software market was beginning to bottom out, and MSA found it increasingly difficult to juggle both micro and mainframe products in a changing marketplace.

In May 1985, Intelligent Systems acquired Peachtree for an undisclosed amount. Intelligent Systems also owns Quadram Corp., Princeton Graphics Systems, Inc. and Intecolor Corp.

Peachtree's transition from MSA to Intelligent Systems required some major changes. "The first thing we had to do was stem the losses," Goodhew says. "Part of MSA's strategy for Peachtree was to have a broad product line in essentially four markets: consumer, education, small and large business. That turned out to be too much to bite off, and so part of the strategy I have encouraged at Intelligent Systems is to narrow our market focus to the small business market."

As a result, the Peachtree product line was cut by about 75%. MSA sold its Micro Distribution Division to Corporate Software, Inc., its Eduware and Designware programs to Encyclopedia Britanica, Ltd. and

See **PEACHTREE** page 90

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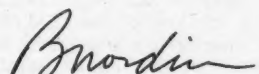

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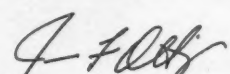

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